IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

WIRTGEN AMERICA, INC.,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. 17-770-RGA
	)	
CATERPILLAR INC.,	)	**JURY TRIAL DEMANDED**
	)	
Defendant.	)	

AMENDED COMPLAINT

Wirtgen America, Inc. ("Wirtgen America") files this Amended Complaint for patent infringement against Caterpillar, Inc. ("Defendant" or "Caterpillar"). Wirtgen America filed a Complaint against Caterpillar and four other Caterpillar subsidiaries in the United States District Court for the District of Minnesota on June 15, 2017. Wirtgen America then filed its original Complaint in this Court on June 16, 2017, asserting infringement of twelve patents belonging to six patent families. Wirtgen America filed suit in this District where Caterpillar resides due to venue considerations arising from the recent decision in *TC Heartland LLC v. Kraft Foods Group Brands LLC*. Wirtgen America states as follows:

THE PARTIES

1. Wirtgen America, Inc. is a Tennessee corporation with its principal place of business at 6030 Dana Way, Antioch, Tennessee 37013-3116. Wirtgen distributes, *inter alia*, cold milling machines throughout the United States.

2. Caterpillar, Inc. is a Delaware corporation with its principal place of business at 100 NE Adams Street, Peoria, Illinois 61629.

3. Caterpillar Inc. is the parent company of Caterpillar Prodotti Stradali S.r.L and Caterpillar Paving Products, Inc.

JURISDICTION AND VENUE

4. This Amended Complaint for patent infringement arises under the patent laws of the United States, Title 35, United States Code, and this court has jurisdiction over those claims pursuant to 28 U.S.C. § 1338, which directs that United States District Courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, and pursuant to 28 U.S.C. § 1331, which pertains to civil actions arising under the laws of the United States.

5. Personal jurisdiction and venue over Caterpillar are proper in this District because Caterpillar, a Delaware corporation, resides in this district.

FACTS

Overview

6. Since opening its headquarters in the Nashville, Tennessee area in 1985, Wirtgen America has been an innovator in the heavy equipment sector and has established itself as "a powerhouse of economic input" in both the local and national economies. (*See* D.I. 1-1 at 10, Exhibit 1, 2016 Nashville Chamber of Commerce Article, "*Wirtgen America Contribution and Impact Analysis*".)[1] For over thirty years, Wirtgen America's business has centered around the advancement, education, and implementation of road construction machines, including milling machines, recyclers, and stabilizers, as well as cold milling technology within the United States.

7. Wirtgen America's road construction machines offer solutions for quickly and efficiently rehabilitating road surfaces. Wirtgen America's road construction machines have been overwhelmingly adopted in the road resurfacing industry because of their superior performance and unrelenting innovation. For example, Wirtgen-brand road milling machine sales have long

[1] Citations to page numbers in previously filed exhibits reference the page number found in the Court's stamp in header of the document.

since accounted for a large majority of the U.S. market.

8. The market success and superior performance of Wirtgen America's road construction machines are byproducts of the technological innovations of Wirtgen America and its related entities over the past several decades. These innovations began with Wirtgen America's affiliated company, Wirtgen GmbH, developing its first cold milling machine for road resurfacing in 1979, and have been continued by Wirtgen America through today.

9. Wirtgen America owns several patents covering various aspects of its innovative road construction machines, including those asserted in this Complaint ("Asserted Patents"). The Asserted Patents are directed towards key features that have been incorporated into Wirtgen America's road construction machines that include, for example, Wirtgen's road milling machines, including the Wirtgen W 200i, W 200 Hi, W 210i, W 220, W 220i, W 250i, W 2200, W 50, W 50 Dci, W 50 Ri, W 60 Ri, W 60i, W 100i, W 100 Fi, W 120 Fi, W 100 CFi, W 120 CFi, W 130 CFi, W 150i, and W 150 Cfi, and Wirtgen's recyclers, including the WR 200 XLi, WR 240i, WR 250. These features have contributed to Wirtgen America's success and have allowed Wirtgen America to establish itself as not only a market leader, but also as a respected educator within the road resurfacing industry. The Wirtgen model W 200i pictured below is exemplary of the Wirtgen road milling machines.

The Wirtgen model WR 240i pictured below is exemplary of the Wirtgen recyclers.

10. In contrast to Wirtgen America, Caterpillar has historically been at best a minor player in the U.S. road construction industry. For example, Caterpillar has never had more than a 10% share of the road milling machine market. But Caterpillar decided to refocus its efforts and emphasize the U.S. road construction machine market. On information and belief, Caterpillar's shift in philosophy was sparked by a desire to capture Wirtgen America's market share.

11. Caterpillar's decision coincided with Caterpillar's purchase, and subsequent analysis, of two Wirtgen-brand road milling machines, a Wirtgen W 210i and a Wirtgen W 120.

12. Following Caterpillar's meticulous dissection of the Wirtgen-brand road milling machines, Caterpillar began importing certain road milling machines in 2016 or 2017, defined as large milling machines based on the width of their milling drums (also called rotors), that included Wirtgen America's patented technology, the PM600 Series (e.g., PM620 and PM622 models) and the PM800 Series (e.g., PM820, PM822, and PM825 models) into the United States. Such Caterpillar road milling machines, supported on two pairs of wheels or tracks and corresponding legs, including a rotor such as a milling drum for working a road surface mounted between the pairs of wheels or tracks, and which incorporate Wirtgen America's patented technology are, collectively, "Large Infringing Products".

13. On further information and belief, since that time, Caterpillar began importing certain road milling machines, defined as compact milling machines based on the width of their milling drums, that included Wirtgen America's patented technology, the PM300 Series (e.g., PM310, PM312, and PM313 models) (collectively, the "Compact Infringing Products"), into the United States. For example, on information and belief, Caterpillar imported a PM312 Compact Infringing Product on May 26, 2016.

Wirtgen America's Patents

14. Wirtgen America is the owner of seven patent families comprising thirteen patents being asserted in this action.

Count	Family	U.S. Patent
1	Four-way Full Floating	7,828,309
2		8,118,316
3	Driving Backwards	7,530,641
4	Path Measurement	8,113,592

5		9,010,871
6		9,656,530
7	Sensor Switching	7,946,788
8		8,511,932
9		8,690,474
10	Vibration Mounting	RE48,268
11	Parallel to Surface	8,424,972
12	Smart Side Plates	9,879,390
13		9,879,391

15. Wirtgen America has marked its products embodying the inventions claimed in these patents with the relevant patent numbers through its virtual marking process. Each machine delivered to a customer carries the following sticker:

16. Wirtgen America is the owner of U.S. Patent No. 7,828,309, ("the '309 patent") entitled "Road-building machine." The '309 patent is generally directed to road-building machines that have a chassis with four ground engaging supports and four working cylinders connecting the ground engaging supports whereby coordinated height adjustment of the ground engaging supports provides improved stability and improves milling quality. A copy of the '309 patent was previously filed as Exhibit 2 to Wirtgen's original Complaint. (D.I. 1-1 at 11-29.)

17. The inventions disclosed and claimed in the '309 patent are road-building machines as described above wherein the working cylinders are positively coupled to one another such that, for example, the left front wheel or track and the right rear wheel or track are adjusted

in height in the opposite direction to the right front wheel or track and left rear wheel or track, the left front wheel or track and the right rear wheel or track being adjusted in height in the same direction. Thus, these machines essentially operate using a floating mount of both the front and rear axle, thereby improving the compensation of both transverse inclination of the road-building machines and unevenness in their longitudinal direction. Consequently, the permissible height of an obstacle which can be driven over by only one wheel of the machine is significantly increased.

18. Wirtgen America is the owner of U.S. Patent No. 8,118,316 ("the '316 patent"), entitled "Operational methods for a road-building machine." The '316 patent is a continuation of the '309 patent and is generally directed to methods of operating the road-building machines described in the '309 patent. A copy of the '316 patent was previously filed as Exhibit 3 to Wirtgen's original Complaint. (D.I. 1-1 at 30-48.)

19. Wirtgen America is the owner of U.S. Patent No. 7,530,641 ("the '641 patent"), entitled "Automotive construction machine, as well as method for working ground surfaces." The '641 patent is generally directed to road-building machines with a monitoring device that senses the distance between the milling drum and the ground surface and, when the machine is traveling in the same direction of the rotation of the milling drum, triggers a safety mechanism to prevent contact of the milling drum with the ground surface. A copy of the '641 patent was previously filed as Exhibit 4 to Wirtgen's original Complaint. (D.I. 1-1 at 49-59.)

20. The inventions disclosed and claimed in the '641 patent are road-building machines as described above wherein the monitoring device, upon sensing potential engagement of the ground surface by the rotating milling drum while raised, uncouples the raised milling drum from the drive engine and/or uncouples the traveling devices from the drive engine and/or raises the machine frame and/or generates an alarm signal. Thus, the milling drum can remain coupled

with the drive engine throughout an operation, even when not working the ground surface, without risk of the milling drum being damaged or the road-building machine being accelerated suddenly and uncontrollably upon inadvertent engagement of the milling drum with the ground surface. This reduces the time required for working a pre-determined ground space by avoiding the need to uncouple the milling drum from the drive engine before traveling in reverse, bring the drive engine down to idle speed to recouple the milling drum, and then bring the drive engine back to operating speed after recoupling.

21. Wirtgen America is the owner of U.S. Patent No. 8,113,592 ("the '592 patent"), entitled "Automotive construction engine and lifting column for a construction engine." The '592 patent is generally directed to road-building machines with measuring devices that determine the height of the machine frame relative to the ground engaging supports by measuring the lifting state of the lifting columns connecting the machine frame to the ground engaging supports. A copy of the '592 patent was previously filed as Exhibit 5 to Wirtgen's original Complaint. (D.I. 1-1 at 60-70.)

22. The inventions disclosed and claimed in the '592 patent are road-building machines as described above wherein each height-adjustable lifting column is provided with a measuring device for measuring the current lifting state of the lifting column, the measuring device is coupled with elements of the lifting column in such a manner that a path signal pertaining to the lifting position of each column is continuously detectable by the measuring device, and that a controller receiving the measured path signals from the measuring devices regulates the lifting state of the lifting columns. Thus, the invention provides for positions of the lifting columns to be adjusted in a regulated manner.

23. Wirtgen America is the owner of U.S. Patent No. 9,010,871 ("the '871 patent"),

entitled "Automotive construction machine, as well as lifting column for a construction machine." The '871 patent claims priority to the '592 patent and is generally directed to the same subject matter. The inventions of the '871 patent include both automotive construction machines and methods of using such machines. A copy of the '871 patent was previously filed as Exhibit 6 to Wirtgen's original Complaint. (D.I. 1-1 at 71-82.)

24. Wirtgen America is the owner of U.S. Patent No. 9,656,530, entitled "Automotive construction machine, as well as lifting column for a construction machine." The '530 patent claims priority to the '592 patent and is generally directed to the same subject matter. The inventions of the '530 patent are directed to automotive construction machines. A copy of the '530 patent was previously filed as Exhibit 7 to Wirtgen's original Complaint. (D.I. 1-1 at 83-93.)

25. Wirtgen America is the owner of U.S. Patent No. 7,946,788 ("the '788 patent"), entitled "Road construction machine, leveling device, as well as method for controlling the milling depth or milling slope in a road construction machine." The '788 patent is generally directed to road construction machines with a leveling device provided with an indication and setting device capable of indicating and altering the data of a current or pre-selected sensor of milling depth or slope and a switchover device capable of switching over from the current sensor to the pre-selected sensor during the milling operation without any repercussion on the work result. It is also directed to methods of using the same. A copy of the '788 patent was previously filed as Exhibit 8 to Wirtgen's original Complaint. (D.I. 1-1 at 94-109.)

26. The inventions disclosed and claimed in the '788 patent are road-building machines as described above wherein the leveling system comprises a plurality of selectable sensors for sensing milling depth and/or slope, a controller operable to control the milling depth and/or slope based on set values and sensed current actual values, and a switchover device operable

to switch over from control based upon a first subset of sensors to a second, different subset of sensors without affecting the milling operation. This avoids faults in the work result or, alternatively, the need to halt the milling operation to switch the sensors being used to maintain a particular milling depth and/or slope, which itself can cause an adverse effect when the milling drum cuts clear while standing.

27. Wirtgen America is the owner of U.S. Patent No. 8,511,932 ("the '932 patent"), entitled "Automotive construction machine, as well as method for working ground surfaces." The '932 patent claims priority to the '788 patent and is generally directed to the same subject matter. A copy of the '932 patent was previously filed as Exhibit 10 to Wirtgen's original Complaint. (D.I. 1-1 at 126-143.)

28. Wirtgen America is the owner of U.S. Patent No. 8,690,474 ("the '474 patent"), entitled "Automotive construction machine, as well as method for working ground surfaces." The '474 patent claims priority to the '788 and '932 patents and is generally directed to the same subject matter. A copy of the '474 patent was previously filed as Exhibit 11 to Wirtgen's original Complaint. (D.I. 1-1 at 144-160.)

29. Wirtgen America is the owner of U.S. Patent No. RE48,268 ("the '268 patent"), entitled "Construction machine, in particular road milling machine, recycler or stabilizer, as well as drive train for construction machines of this type." The '268 patent is generally directed to road construction machines with a particular drive train mounting and arrangement that reduces transmission of vibrations from components of the drive train, such as the drive engine, to the machine frame. It is also directed to methods of using the same. A copy of the '268 patent is attached hereto as Exhibit 27.

30. The inventions disclosed and claimed in the '268 patent are road-building

machines as described above wherein the drive train is divided into two groups such that the groups can be supported with different degrees of rigidity on the machine frame. An articulated coupling device, for example an elastomeric coupling, between the two groups can balance the different vibrational behavior of the two groups due to its articulation, without impeding a high transmission of power. This makes it possible to easily achieve a configuration where, on the one hand, the one group that comprises the drive engine is supported in a relatively soft manner at the machine frame, by way of which the vibrations from the drive engine that are transmitted to the machine frame are damped considerably, and, on the other hand, the other group can be supported at the machine frame with high spring stiffness or in a nearly rigid or rigid manner, by way of which higher forces are supported and higher outputs are transmittable as a result.

31. Wirtgen America is the owner of U.S. Patent No. 8,424,972 ("the '972 patent"), entitled "Road milling machine and method for positioning the machine frame parallel to the ground." The '972 patent is generally directed to road milling machines comprising sensors and control systems that automatically control the lifting condition of one or more lifting columns to position the machine frame parallel to the ground or traffic surface or to position the machine frame at a predetermined milling level. It is also directed to methods of using the same. A copy of the '972 patent is attached hereto as Exhibit 28.

32. The inventions disclosed and claimed in the '972 patent are road milling machines wherein a controller uses data from one or more various ground-engaging sensors, such as lifting position sensors, lifting plate sensors, track angle sensors, and stripping plate sensors, to control the extension and retraction of one or more lifting columns of the machine to maintain the machine frame parallel to the ground or traffic surface or to position the machine frame at a predetermined milling level. This solution allows a controller to automatically set and/or maintain

a parallel orientation of the machine frame automatically so that the operator does not have to continuously make adjustments to inclination.

33. Wirtgen America is the owner of U.S. Patent No. 9,879,390 ("the '390 patent"), entitled "Road milling machine and method for measuring the milling depth." The '390 patent is generally directed to road milling machines comprising sensors and control systems that automatically control milling depth and/or transverse or longitudinal inclination of the machine frame. A copy of the '390 patent is attached hereto as Exhibit 29.

34. The inventions disclosed and claimed in the '390 patent include road milling machines provided with one or more sensors, such as side-plate sensors (and, more specifically, position-sensing hydraulic cylinders) spaced apart in the traveling direction of the machine. These sensors may permit determination of milling depth and/or transverse or longitudinal inclination of the machine frame, and, in combination with a controller, the sensor data can be used to control the extension and retraction of one or more lifting columns of the machine. This solution improves the accuracy of measuring the milling depth during the operation of a road milling machine and thereby minimizes deviations from a predetermined milling depth.

35. Wirtgen America is the owner of U.S. Patent No. 9,879,391 ("the '391 patent"), entitled "Automotive construction machine, as well as method for working ground surfaces." The '391 patent claims priority to the '390 patent and is generally directed to methods of operating the road-building machines described in the '390 patent. A copy of the '391 patent is attached hereto as Exhibit 30.

Caterpillar's Infringing Products

36. Since the introduction of the Large Infringing Products, Caterpillar has coordinated the importation of at least one hundred fifty-four (154) units of the Large Infringing

Products into the United States.

37. U.S. Customs import records indicate that at least seventy-five (75) PM622 machines have been imported into the United States between May 8, 2016, and the present. Those records further indicate that at least twenty-eight (28) PM620 machines have been imported into the United States between April 29, 2016, and the present.

38. U.S. Customs import records indicate that at least thirty-eight (38) PM 822 machines have been imported into the United States between January 13, 2018, and the present. Those records further indicate that at least twelve (12) PM 825 machines have been imported into the United States between April 2, 2018, and the present, as well as one (1) PM 820 machine on April 13, 2019.

39. Since the introduction of the Compact Infringing Products, Caterpillar has coordinated the importation of at least fifty-four (54) units of the Compact Infringing Products into the United States.

40. Upon information and belief, Caterpillar Prodotti Stradali S.r.L. ("Caterpillar Prodotti Stradali") manufactures and sells the Large Infringing Products and Compact Infringing Products for importation into the United States. For example, Caterpillar Prodotti Stradali manufactures cold planer machines and is based in Minerbio, Italy. (*See* D.I. 1-1 at 217, Exhibit 15, Bloomberg.com company overview of Caterpillar Prodotti Stradali.)

41. Caterpillar Prodotti Stradali imports the Large Infringing Products and Compact Infringing Products into the United States.

42. Caterpillar Paving Products, Inc. ("Caterpillar Paving Products") facilitates importation of the Large Infringing Products. U.S. customs import records identify Caterpillar Paving Products as the consignee of thirty-eight (38) PM 622 machines, five (5) PM 620 machines,

twenty-six (26) PM 822 machines, and six (6) PM 825 machines.

43. Caterpillar Paving Products also facilitates importation of the Compact Infringing Products. U.S. customs import records identify Caterpillar Paving Products as the consignee of four (4) PM 312 machines and one (1) PM313 machine.

44. Caterpillar Prodotti Stradali sells the machines to Caterpillar Paving Products upon importation.

45. Caterpillar Paving Products then transfers title to the machines to Caterpillar Inc.

46. Caterpillar Inc. directs and coordinates the activities of Caterpillar Prodotti Stradali and Caterpillar Paving Products, including the importation into the United States of the Large Infringing Products and Compact Infringing Products. U.S. import records identify Caterpillar Inc. as the global headquarters for each importation discussed above.

47. Caterpillar Inc. enters into agreements with local dealers around the country, whereby Caterpillar Inc. permits the local dealers to purchase the Large Infringing Products and Compact Infringing Products at wholesale prices. On further information and belief, Caterpillar Inc. has agreements with at least two Delaware dealers, Carter CAT: Felton, with a brick-and-mortar location at 13074 S. Dupont Highway, Felton, Delaware 19943, and Foley CAT, with a brick-and-mortar location at 720 Pulaski Highway, Bear, Delaware 19701. Both dealers' websites advertise the PM620, PM622, PM820, PM822, and PM825 machines as new machines available for purchase. Carter CAT also advertises the PM310 machine as a new machine available for purchase.

48. On information and belief, Caterpillar Inc. also distributes the Infringing Products in the United States after importation. The badge on a PM822 observed in the United States indicated that the PM822 was made in Italy and distributed by Caterpillar Inc.

49. On further information and belief, Caterpillar Inc. directs or controls pricing of the products-at-issue in this case. For example, price lists for the Large Infringing Products and the Compact Infringing Products bear the name Caterpillar Inc. (*See* Exhibit 31, Caterpillar Inc. Pricelist (Nov. 1, 2018).)

50. Caterpillar Inc. also owns several trademark registrations for trademarks associated with infringing products either through display directly on infringing products or in video and print advertisements for infringing products. For example, Caterpillar Inc. owns U.S Trademark Registration No. 4,804,266 for:

CAT;

U.S. Trademark Registration No. 3,750,812 for:

;

U.S. Trademark Registration No. 2,448,848, for:

CATERPILLAR;

and U.S. Trademark Registration No. 4,676,117, for:

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51. On information and belief, the goodwill associated with these trademarks is being used to advertise and sell the Infringing Products at the direction of Caterpillar Inc. For example, a Caterpillar brochure, dubbed a "specalog", advertising the PM620 and PM622 machines bears a copyright to Caterpillar Inc. (*See* D.I. 1-1 at 262.)

52. Caterpillar's Infringing Products include functionality that infringes Wirtgen America's patented technology. For example, each of the Large Infringing Products includes one or more of: (1) a stabilized chassis that infringes the four-way full floating patents; (2) milling drum uncoupling functionality that infringes the driving backwards patent; (3) height-adjustable lifting columns that infringe the path measurement patents; (4) a grade and slope control system that infringes the sensor switching patents; (5) a drive-train arrangement that infringes the vibration mounting patents; (6) height-adjustable lifting columns combined with a controller that infringe the parallel-to-surface patents; and (7) position-sensing side-plate cylinders that infringe the smart

side plate patents. And each of the Compact Infringing products includes at least one or more of: (1) milling drum uncoupling functionality that infringes the driving backwards patent; and (2) position-sensing side-plate cylinders that infringe the smart side plate patents.

The Section 337 Investigation at the International Trade Commission

53. On July 19, 2017, Wirtgen America filed a complaint pursuant to 19 U.S.C. § 1337 with the United States International Trade Commission ("ITC") alleging that Caterpillar Inc., Caterpillar Paving Products, Inc., Caterpillar Prodotti Stradali S.r.L., and Caterpillar Americas CV unlawfully imported certain road milling machines, including the Large Infringing Products, and components thereof. That complaint asserted U.S. Patent Nos. 7,530,641 ("the '641 patent"); 7,828,309 ("the '309 patent"); 9,624,628 ("the '628 patent"); 9,644,340 ("the '340 patent"); and 9,656,530 ("the '530 patent").

54. On August 25, 2017, the ITC instituted a Section 337 investigation, Investigation No. 337-TA-1067 ("the 1067 Investigation"), to determine whether there was a violation of subsection (a)(1)(B) of 19 U.S.C. § 1337 by the importation into the United States, the sale for importation, or the sale within the United States after importation of Caterpillar's milling machines and components thereof by infringement of one or more of claims 1, 2, 4, 6-8, 11, 12, and 15-17 of the '641 patent; claims 1-3, 5-24, and 26-36 of the '309 patent; claims 1, 2, 5, 6, 9-22, and 27-29 of the '628 patent; claims 1-5, 7-12, and 14-17 of the '340 patent; and claims 1-7, 13-24, and 26 of the '530 patent.

55. After institution, this Court stayed the instant action as to the patents asserted in the 1067 Investigation as required by 28 U.S.C. § 1659 and exercised its discretion to stay the case as to the other patents asserted in the Complaint. (*See* D.I. 9.)

56. Throughout the 1067 Investigation, pursuant to ITC ground rules, Wirtgen

sought to narrow the asserted claims to streamline the investigation.

57. On January 29, 2018, Wirtgen filed an unopposed motion seeking to terminate the 1067 Investigation as to multiple claims from the ’641, ’309, ’628, ’340, and ’530 patents, which the administrative law judge granted on February 5, 2018. The ITC did not review that decision.

58. On March 14, 2018, Wirtgen again filed an unopposed motion seeking to terminate the 1067 Investigation as to multiple claims from the ’641, ’309, ’628, ’340, and ’530 patents, which the administrative law judge granted on March 15, 2018. The ITC did not review that decision.

59. During the 1067 Investigation, Caterpillar asserted non-infringement of the ’309, ’340, and ’628 patents by PM600 and PM800 machines that contained so-called 2018 product updates. Caterpillar alleged that these machines included certain design changes to the machines-at-issue that were not covered by the asserted claims. The administrative law judge declined to adjudicate whether the 2018 product updates infringed.

60. On October 1, 2018, the administrative law judge issued a Final Initial Determination (“FID”) concluding (1) that Caterpillar failed to show that claims 10, 29, and 36 of the ’309 patent are invalid; (2) that the PM600 and PM800 series machines (i.e., the Large Infringing Products) infringe claims 29 and 36 of the ’309 patent; (3) that Caterpillar failed to show that claims 11, 15, and 17 of the ’641 patent are invalid; (5) that, “[a]ssuming that the PM620 and PM312 are used in the United States, the evidence shows that the PM620 and PM312 practice limitations 11[a]-11[g] when they are driven in reverse” and “practice the steps of claims 15 and 17 when the milling drum is raised and they are driven in reverse;” (5) that Caterpillar failed to show that claims 2, 5, 16, and 23 of the ’530 patent are invalid; and (6) that the PM600 and PM800

series machines (i.e., the Large Infringing Products) infringe claims 2, 5, 16, and 23 of the '530 patent. A copy of the FID is attached hereto as Exhibit 32.

61. The parties petitioned for ITC review of various findings of the Final Initial Determination in the 1067 Investigation.

62. On July 18, 2019,[2] the ITC issued its Final Determination, a limited exclusion order precluding importation of road milling machines (e.g., the Large Infringing Products) and components thereof covered by claim 29 of the '309 patent or claims 2, 5, 16, or 23 of the '530 patent, and a cease and desist order precluding "any of the following activities in the United States: importing, selling, offering for sale, marketing, advertising, distributing, transferring (except for exportation) and soliciting United States agents or distributors for road milling machine and components thereof that infringe one or more of claim 29 of U.S. Patent No. 7,828,309 or claims 2, 5, 16, or 23 of U.S. Patent No. 9,656,530 in violation of Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337." A public copy of the Final Determination is attached hereto as Exhibit 33. A copy of the limited exclusion order is attached hereto as Exhibit 34. A copy of the cease and desist order against Caterpillar Paving Products, Inc. is attached hereto as Exhibit 35. A copy of the cease and desist order against Caterpillar Inc. is attached hereto as Exhibit 36.

63. The parties then appealed certain findings of the ITC Final Determination in the 1067 Investigation to the United States Court of Appeals for the Federal Circuit ("the Federal Circuit"). In particular, Wirtgen appealed the ITC's determination that Caterpillar's acts with respect to the PM600 and PM800 machines (i.e., the Large Infringing Products) did not induce infringement of the '641 patent by Caterpillar's customers.

[2] The public version issued August 7, 2019.

64. On March 15, 2021, the Federal Circuit issued its opinion in the consolidated appeals captioned *Caterpillar Prodotti Stradali S.r.L. et al. v. Int'l Trade Comm'n et al.*, No. 2019-2445, and *Wirtgen America, Inc. v. Int'l Trade Comm'n et al.*, No. 2019-1911. The Federal Circuit affirmed the ITC's decision regarding the validity of the claims of the '309 and '530 patents and reversed-in-part as to the ITC's decision regarding Caterpillar's inducement of infringement of the '641 patent by its customers. Specifically, the Federal Circuit vacated the ITC's determination of no induced infringement as to the '641 patent.

65. The ITC's decision in the 1067 Investigation that the Large Infringing Products infringe certain valid claims of the '309 and '530 patents is final, and the ITC has issued a limited exclusion order prohibiting Caterpillar's importation of the Large Infringing Products and components thereof prior to the expiration of those patents.

The *Inter Partes* Review Proceedings at the Patent Trial and Appeal Board

66. During the pendency of both this action and the 1067 Investigation, Caterpillar petitioned the Patent Trial and Appeal Board of the United States Patent and Trademark Office ("PTAB") for *inter partes* review ("IPR") of the '309 and '530 patents. Caterpillar did not petition for IPR of the '641 patent.

67. On October 19, 2017, Caterpillar petitioned for IPR of the '309 patent, seeking a decision from the PTAB finding that claims 1-3, 5-24, and 26-36 are unpatentable.

68. On July 11, 2019, the PTAB entered a revised final written decision determining that Caterpillar had failed to establish that claims 10, 17-20, and 29-32 are unpatentable.

69. On August 15, 2019, Caterpillar filed an appeal of that decision as to, *inter alia*, the PTAB's findings that claims 10, 17-20, and 29-32 of the '309 patent are not unpatentable.

70. On February 3, 2021, the Federal Circuit affirmed the PTAB without opinion pursuant to Federal Circuit Rule 36.

71. Also on October 19, 2017, Caterpillar petitioned for IPR of the ’530 patent, seeking a decision from the PTAB finding that claims 1-7, 13-24, and 26 are unpatentable.

72. On May 22, 2019, the PTAB entered a final written decision determining that Caterpillar had failed to establish that claims 1-7, 13-24, and 26 are unpatentable.

73. On July 23, 2019, Caterpillar filed an appeal of that decision as to, *inter alia*, the PTAB’s findings that claims 1-7, 13-24, and 26 of the ’530 patent are not unpatentable.

74. On February 3, 2021, the Federal Circuit affirmed the PTAB without opinion pursuant to Federal Circuit Rule 36.

75. The PTAB’s decisions finding claims 10, 17-20, and 29-32 of the ’309 patent and claims 1-7, 13-24, and 26 of the ’530 patent are not unpatentable are final.

76. Like the ITC, the PTAB found claim 29 of the ’309 patent and claims 2, 5, 16, and 23 of the ’530 patent valid.

Caterpillar Began Domestic Manufacturing During the Pendency of this Action

77. Caterpillar began domestic manufacturing of the Large Infringing Products in its facility located in North Little Rock, Arkansas by at least 2019.

78. For example, a July 6, 2018, article from the Arkansas Democrat Gazette states that “[s]tarting next year, the company [Caterpillar] also will be using the North Little Rock facility for producing cold planers and rotary mixers, which are used in paving projects.” The article is attached hereto as Exhibit 37.

79. Caterpillar’s website indicates that it offers tours of its North Little Rock,

Arkansas facility that where "Cold Planers" (a.k.a., milling machines) are manufactured. A copy of the webpage is attached hereto as Exhibit 38.

80. The Facebook group for "We Are Caterpillar North Little Rock" has included several posts indicating that the Caterpillar PM600 series machines are being manufactured at the North Little Rock, Arkansas facility. Copies of those posts are attached hereto as Exhibit 39. For example, a video of a PM620 was posted with a caption stating: "Please allow us to introduce you to the newest member of our NLR family, the CAT® PM620. This asphalt-eating machine is the first cold planer of many to be built by our talented team." *See* Ex. 39 at 5.

81. Several LinkedIn profiles for various Caterpillar employees working at the North Little Rock, Arkansas facility relate to cold planer production at that facility. Copies of those profiles are attached hereto as Exhibit 40.

82. The Educational Services Commission of New Jersey website provides several PDF documents that provide pricing for PM620, PM622, PM820, PM822, and PM825 machines produced in Little Rock, Arkansas.

83. Caterpillar began domestically manufacturing the Large Infringing Products after the ITC administrative law judge issued his determination that the Large Infringing Products infringed valid claims of the '309 and '530 patents.

84. Caterpillar began its domestic manufacturing activities to avoid Customs' seizure and exclusion of Large Infringing Products imported from Italy in violation of the limited exclusion order issued by the ITC.

COUNT 1: INFRINGEMENT OF U.S. PATENT NO. 7,828,309
(FOUR-WAY FULL FLOATING 1)

85. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

86. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the '309 patent by importing, making, distributing, using, offering to sell, or selling one or more Large Infringing Products manufactured at least before about October 2020. Caterpillar has engaged in activities which constitute direct infringement of at least claims 10, 17-20, 25, and 29-32 of the '309 patent, in violation of U.S.C. § 271(a).

87. Claim 29 of the '309 patent depends from claim 26 of the '309 patent. Claim 26 of the '309 patent recites:

> A road-building machine, comprising:
> a chassis having a forward direction;
> a left front wheel or caterpillar;
> a right front wheel or caterpillar;
> a left rear wheel or caterpillar;
> a right rear wheel or caterpillar;
> a first working cylinder rigidly connected to the chassis and connected to the left front wheel or caterpillar for adjusting a height of the left front wheel or caterpillar relative to the chassis;
> a second working cylinder rigidly connected to the chassis and connected to the right front wheel or caterpillar for adjusting a height of the right front wheel or caterpillar relative to the chassis;
> a third working cylinder rigidly connected to the chassis and connected to the left rear wheel or caterpillar for adjusting a height of the left rear wheel or caterpillar relative to the chassis;
> a fourth working cylinder rigidly connected to the chassis and connected to the right rear wheel or caterpillar for adjusting a height of the right rear wheel or caterpillar relative to the chassis;
> a rotating working roller or rotor supported from the chassis between the front wheels or caterpillars and the rear wheels or caterpillars and extending transversely to the forward direction;
> each of the working cylinders including at least one working chamber filled with a pressure medium; and
> coupling lines connecting the working cylinders to one another and providing

> a positive hydraulic coupling between the working cylinders in such a way that the left front wheel or caterpillar and the right rear wheel or caterpillar are adjusted in height in the same direction and in the opposite direction to the right front wheel or caterpillar and the left rear wheel or caterpillar.

88. The hydraulic arrangement of claim 26 is sometimes referred to as a "four-way full floating" mode of operation. As the '309 patent discloses, the hydraulic system of the road milling machine typically allows for other operational modes to provide various functionalities at various times. The "four-way full floating" mode of operation is just one of the operational modes of the machine, and the claimed hydraulic arrangement is the arrangement that is present during the "four-way full floating" mode of operation.

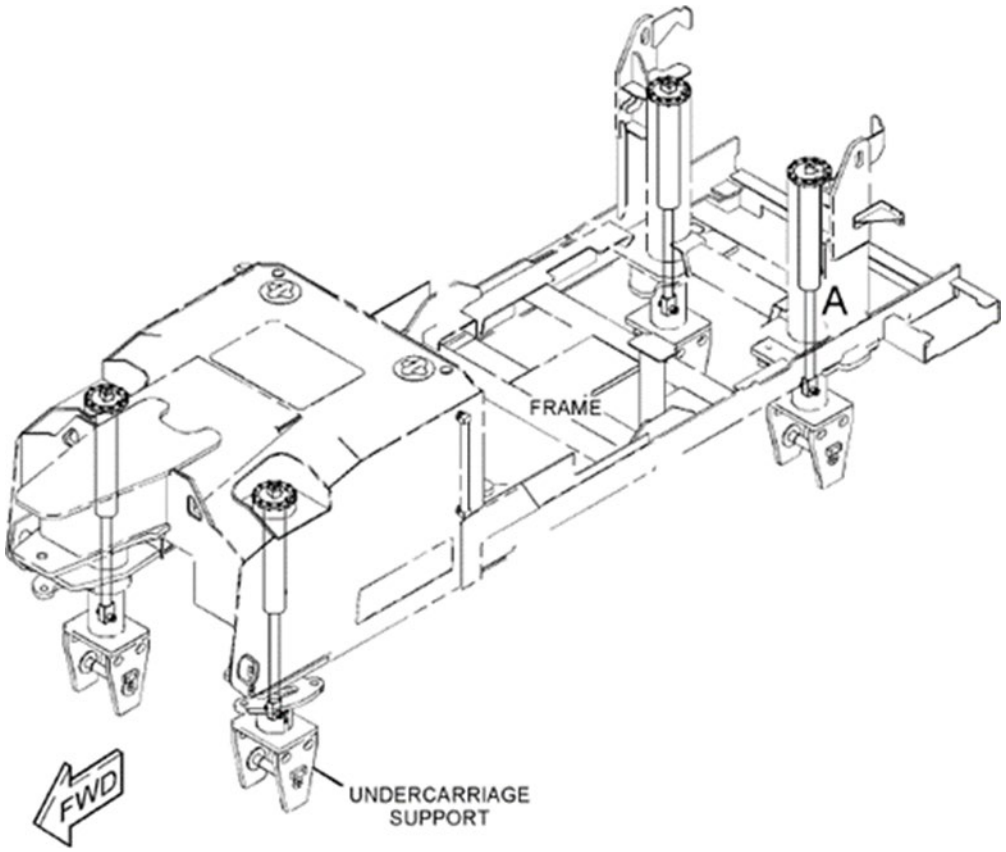
89. Claim 29 recites:

> The road-building machine of claim 26, wherein the machine has a four sided stability pattern having a widest transverse dimension, transverse to the forward direction of the chassis, which widest transverse dimension falls within a footprint of the working roller or rotor.

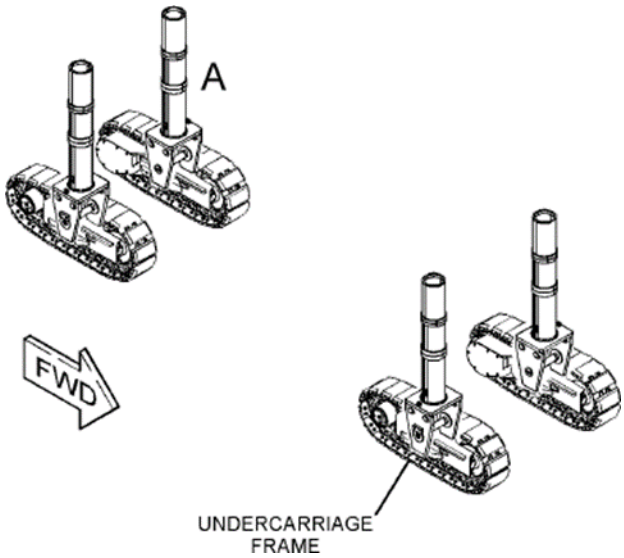
90. As depicted in the Caterpillar brochure, the Large Infringing Products manufactured at least before about October 2020 are road-building machines.

(D.I. 1-1 at 260.)

91. The Large Infringing Products comprise a chassis having a forward direction. (D.I. 1-4 at 24.)

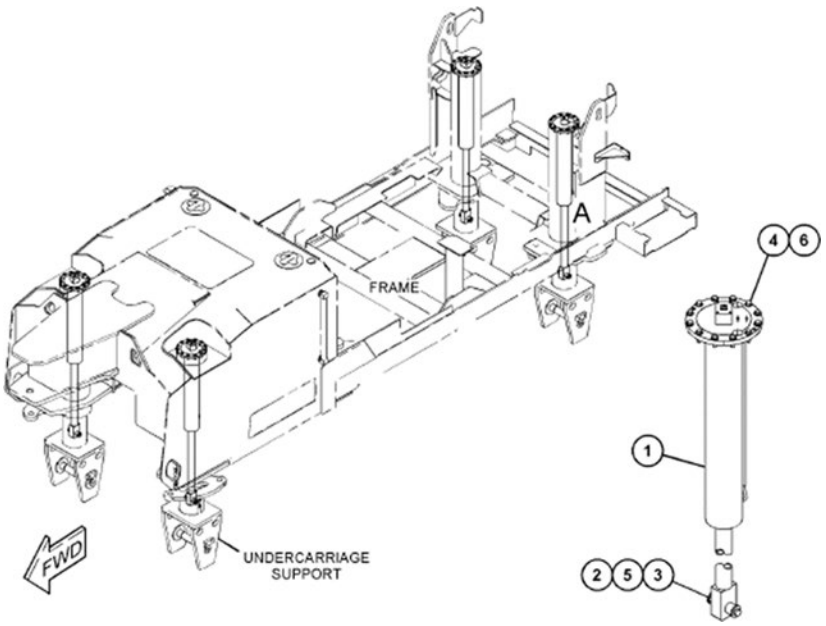


92. The Large Infringing Products further comprise a left front caterpillar, right front caterpillar, left rear caterpillar, and right rear caterpillar.



(D.I. 1-4 at 2.)

93. Four working cylinders are rigidly bolted to the chassis and connected to each of the four caterpillars.



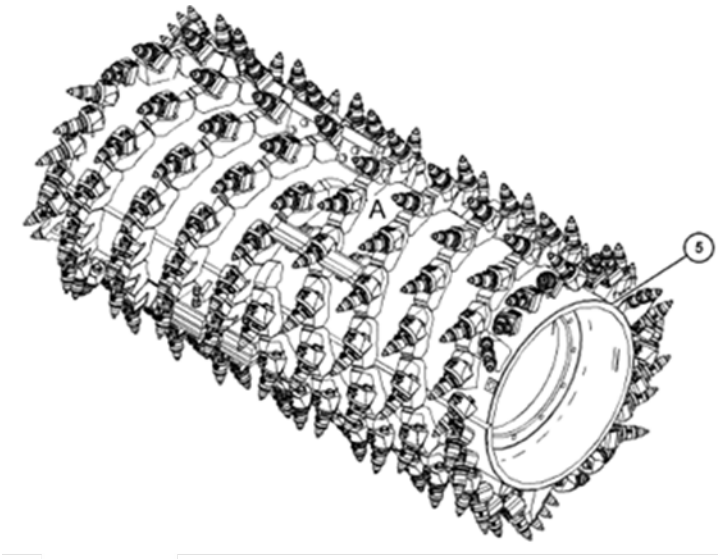
(D.I. 1-4 at 24 (indicating that the part designated "4", part # 8T-4183, is a bolt).) Each of the working cylinders can be actuated to adjust the height of the attached caterpillar relative to the chassis.

STABLE PLATFORM

– Four leg posts with position sensors independently adjust and provide powered vertical movement to maintain desired height

(D.I. 1-1 at 245.) The Operation and Maintenance Manual for the PM620 and PM622 (KEBU7584-01, February 2016) further discusses the adjustability of the height of the legs. (D.I. 1-6 at 49-50.)

94. The Large Infringing Products include a rotor.



(D.I. 1-4 at 183.) The rotor is supported from the chassis between the front caterpillars and the rear caterpillars and extends transversely to the forward direction.

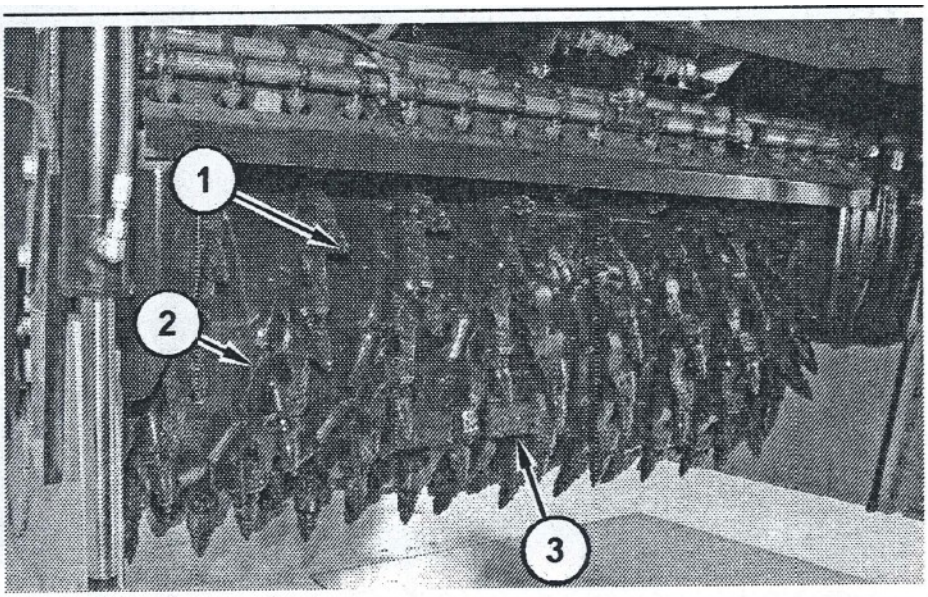


Illustration 64 g06073159

Rotor Drum

(1) Cutter bits
(2) Flighting
(3) Paddles

The rotor is the work tool of the machine. The rotor is located in the center of the machine, between the front and rear tracks.

(D.I. 1-6 at 275, Caterpillar Publication UENR6294, Systems Operation Testing and Adjusting, PE622, PM620 and PM622 Cold Planer Machine System (October 2016).)

95. Figure 7 of the '309 patent compares the stability of the "four-way full floating" arrangement to the "conventional" hydraulic arrangement previously used in road milling machines. (*See* D.I. 1-1 at 21.) Conventional machines have a floating axle at the front and a rigid axle at the rear or alternatively a floating axle at the rear and a rigid axle at the front. This "conventional" arrangement is also sometimes referred to as a "classical" hydraulic coupling arrangement for road milling machines. As illustrated in Figure 7 of the '309 patent, a road construction machine using the "conventional" or "classical" arrangement remains stable only if

the center of gravity lies within the stability triangle A', B', C'. (*See* D.I. 1-1 at 21.)

96. In contrast, road construction machines equipped with a four-way full floating mode of operation as disclosed in the '309 patent remain stable when the center of gravity lies with the stability diamond A, B, C, D. Figure 7 of the '309 patent is reproduced below for reference:

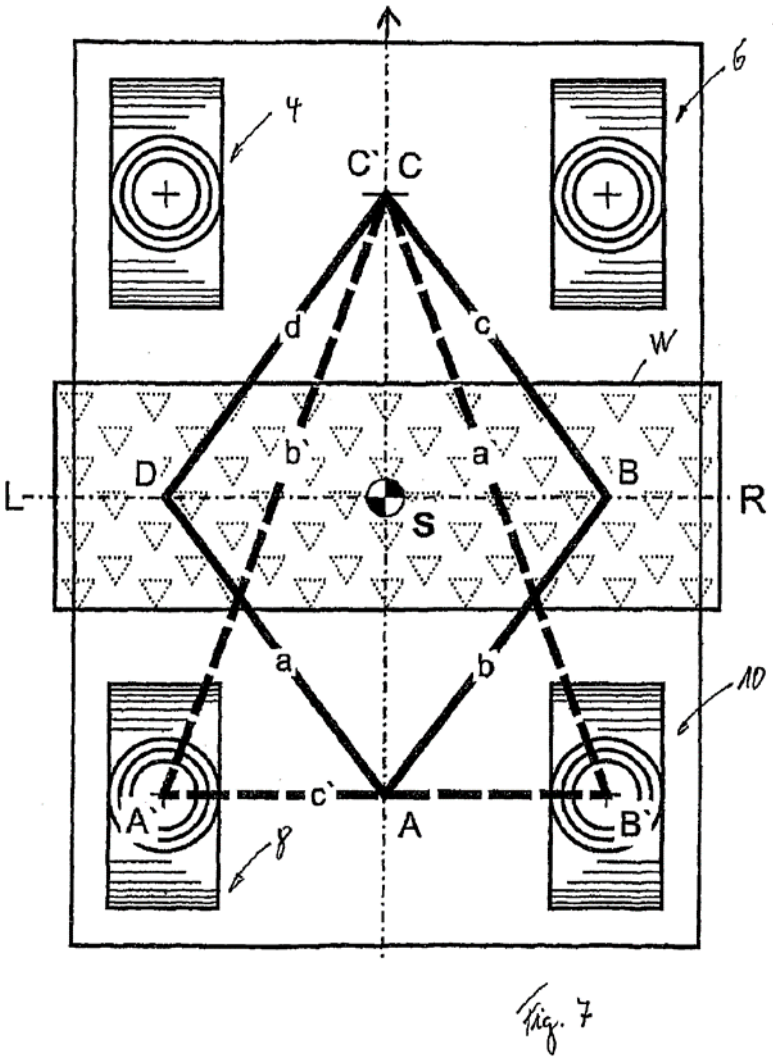


Fig. 7

(D.I. 1-1 at 21.)

97. The Large Infringing Products manufactured at least before about October 2020 can automatically switch between operating in a "conventional" or "classical" mode and a "four-way full floating" mode. Caterpillar calls its "four-way full floating" mode "ride control."

When enabled, the ride control system is automatically activated when the following conditions are met:

- "Automatic" grade and slope control of the front legs is disabled.
- Machine speed is greater than 0.2 kph (0.12 mph) for 2 seconds.
- A RAISE or LOWER command is not present.

(D.I. 1-6 at 258.)

98. For frame of reference, the average walking speed of a human is 3.1 mph, more than twenty-five times faster than that required for automatic activation of ride control in the Infringing Products.

99. The Large Infringing Products manufactured at least before about October 2020 include a hydraulic system containing a pressure medium such as oil which fills at least one working chamber of each working cylinder.

Rear leg lower solenoid (2) controls directional oil flow for both the rear leg cylinders. When this solenoid is energized, supply oil is directed to the rod end of the cylinder and a counterbalance valve. Return oil from the head end of the cylinders is directed to the return line.

Rear leg raise solenoid (5) controls directional oil flow for both the rear leg cylinders. When this solenoid is energized, supply oil is directed to the head end of the cylinder and opens pilot check valve (4). Return oil from the rod end of the cylinder is directed to the return line.

(D.I. 1-6 at 228 (explaining that hydraulic oil is supplied to rod end and head end chambers of each rear leg cylinder).)

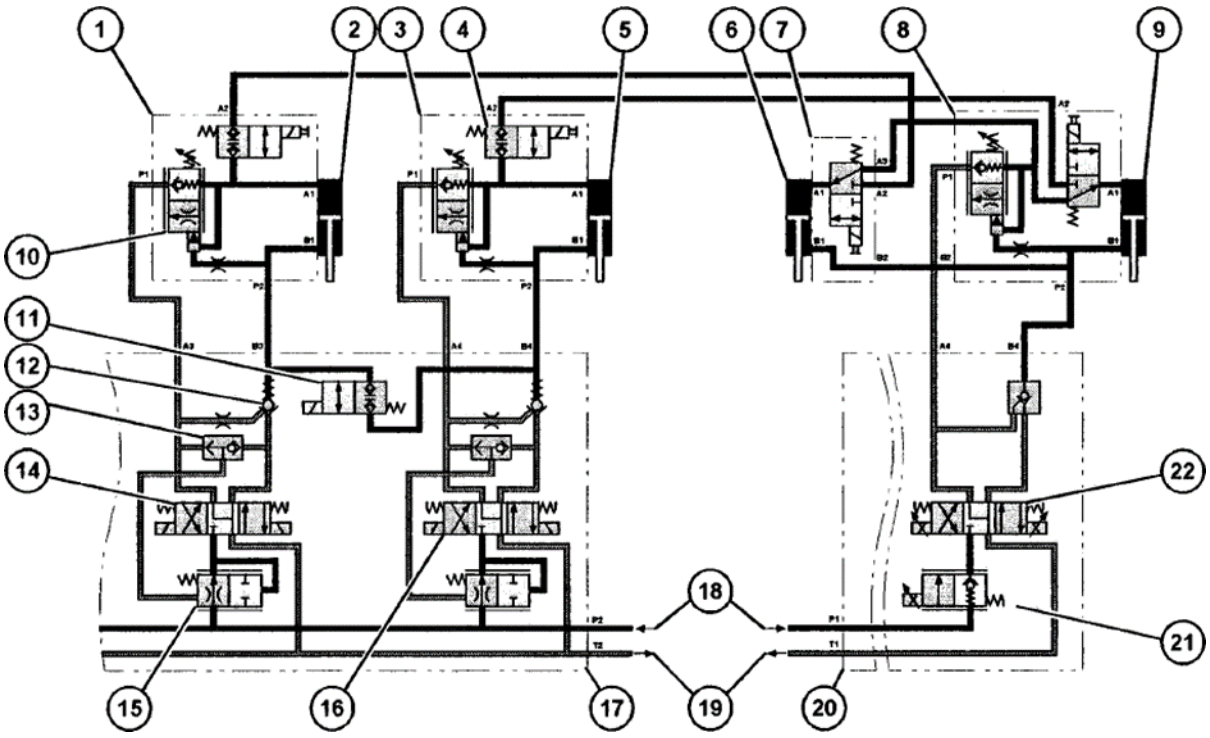
Right front leg lower solenoid (3) and left front leg lower solenoid (4) operate in the same manner. These solenoids control directional oil flow to the front leg cylinders. When either solenoid is energized, supply oil is correspondingly directed to the rod end of the cylinder and a counterbalance valve. Return oil from the head end of the cylinder is directed to the return line.

…

> Right front leg raise solenoid (7) and left front leg raise solenoid (8) operate in the same manner. These solenoids control directional oil flow to the front leg cylinders. When either solenoid is energized, supply oil is correspondingly directed to the head end of the cylinder and opens respective pilot check valve (5). Return oil from the rod end of the cylinder is directed to the return line.

(D.I. 1-6 at 230-31 (explaining that hydraulic oil is supplied to rod end and head end chambers of each front leg cylinder).)

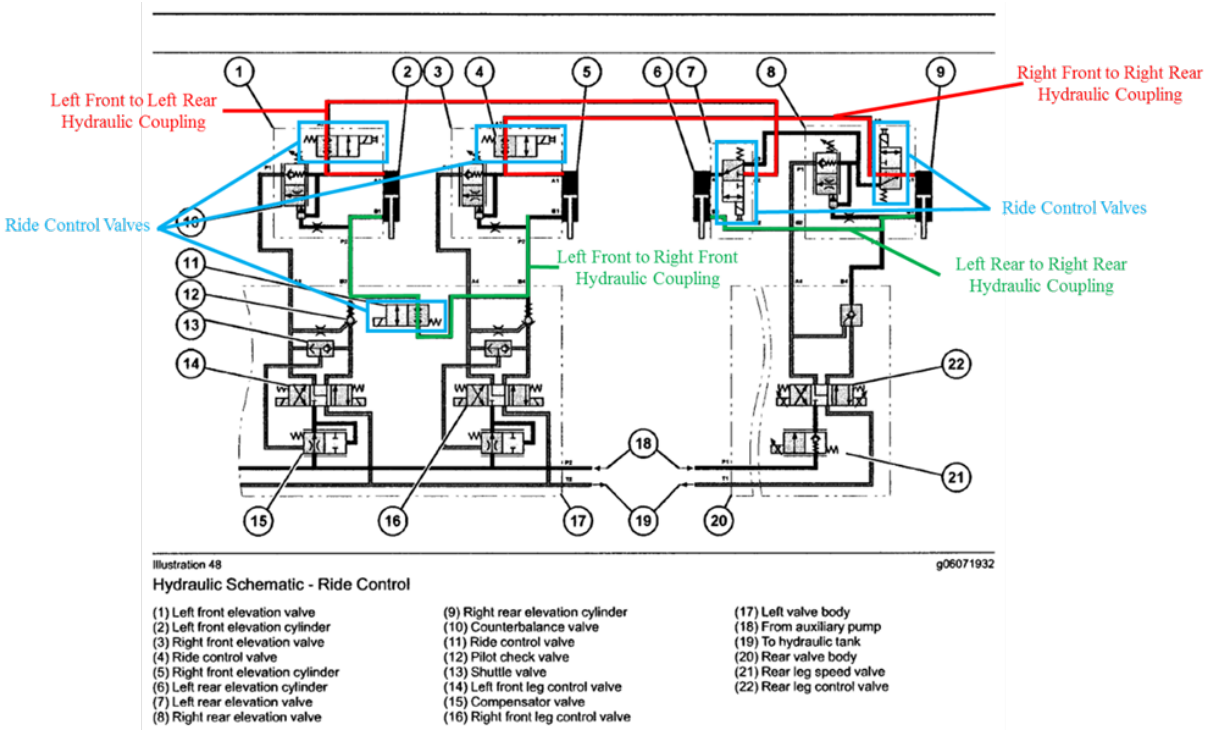
100. The schematic below shows the hydraulic arrangement of the Large Infringing Products manufactured at least before about October 2020 when operating in the ride control mode. The working cylinders (designated "2," "5," "6," and "9") are double-acting working cylinders (i.e., differential cylinders) with a first working chamber at the head end and a second working chamber at the rod end. Coupling lines are connected to both the head end and rod end of each cylinder. Those coupling lines further connect the working cylinders to one another.



(D.I. 1-6 at 258.)

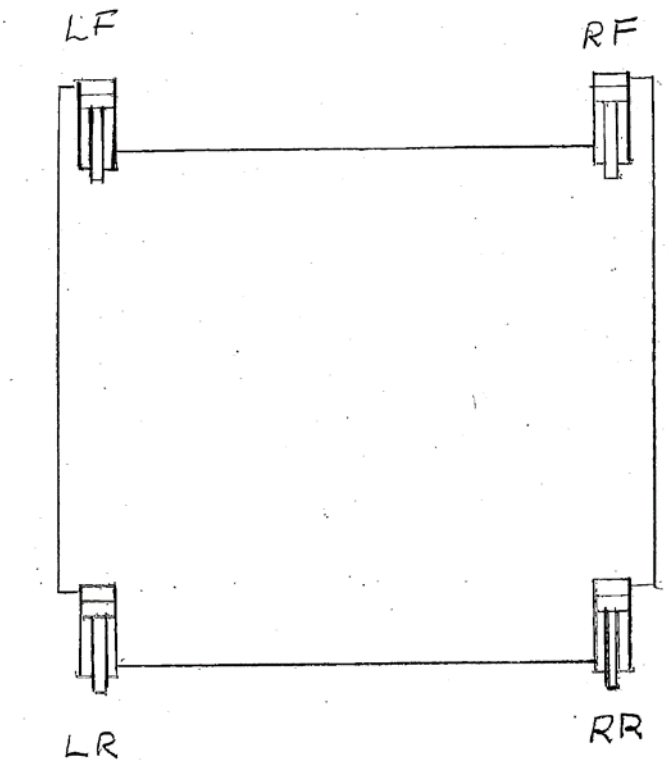
101. When in ride control mode, the working cylinders are positively coupled to one

another; "the leg cylinders are connected in a series circuit." (D.I. 1-6 at 258.) In the Large Infringing Products manufactured at least before about October 2020, this is accomplished using five ride control valves. (*See* D.I. 1-6 at 258.) "When the ride control feature is activated, the five ride control valves (4) and (11) open simultaneously." (D.I. 1-6 at 258.) As a result, the first working chamber of the left front cylinder is coupled to the first working chamber of the left rear cylinder, the first working chamber of right front cylinder is coupled to the first working chamber of the right rear cylinder, the second working chamber of the left front cylinder is coupled to the second working chamber of the right front cylinder, and the second working chamber of the left rear cylinder is coupled to the second working chamber of the right rear cylinder.



(D.I. 1-6 at 258.) "In this condition, the pressure in the four leg cylinders is equalized." (D.I. 1-6 at 258.) "Each leg is tied together hydraulically to allow flow sharing and automatic adjustment of the legs when traveling over obstacles." (D.I. 1-6 at 513, Caterpillar Publication UENR6406, Systems Operation Troubleshooting, PE622, PM620 and PM622 Cold Planers Electronic System

(March 2016).) In effect, actuation of any actuating member causes the left front and right rear caterpillars to be adjusted in height in the same direction and in the opposite direction to the right front and left rear caterpillars. In simplified form, when in ride control mode the four cylinders are connected as shown below.



102. Accordingly, all the claim limitations of claim 26 of the ’309 patent are met by the Large Infringing Products manufactured at least before about October 2020.

103. In the Large Infringing Products, the milling drum (or rotor) is located centrally between the front lifting columns and rear lifting columns. Consequently, when operated in “ride control” mode, the Large Infringing Products manufactured at least before about October 2020 exhibit a “four sided stability pattern having a widest transverse dimension, transverse to the forward direction of the chassis, which widest transverse dimension falls within a footprint of the working roller or rotor.”

(D.I. 1-1 at 245.)

104. Accordingly, all the claim limitations of claim 29 of the '309 patent are met by the Large Infringing Products manufactured at least before about October 2020.

105. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the '309 patent.

106. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

107. Caterpillar Paving Products cited the '309 patent during prosecution of at least U.S. Patent Nos. 8,757,729 (issued June 24, 2014), 8,874,325 (issued October 28, 2014), and 8,973,688 (issued March 10, 2015), all of which were assigned to Caterpillar Paving Products at the time they issued.

108. Caterpillar was made aware of the '309 patent and its infringement thereof at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

109. On October 1, 2018, the administrative law judge issued an FID concluding that Caterpillar's Large Infringing Products infringe valid claims 29 and 36 of the '309 patent. That decision was affirmed by both the ITC and the Federal Circuit.

110. Claims 10, 17–20, and 29–32 of the '309 patent were held valid in an IPR challenge before the PTAB. That decision was affirmed without opinion by the Federal Circuit.

111. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

112. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

113. Any continued assertions by Caterpillar that claim 29 of the '309 patent is invalid or that the Large Infringing Products manufactured at least before about October 2020 do not infringe claim 29 of the '309 patent would render this case exceptional under 35 U.S.C. § 285 and would constitute unreasonable and vexatious multiplication of the proceedings under 28 U.S.C. § 1927.

114. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

115. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 2: INFRINGEMENT OF U.S. PATENT NO. 8,118,316
(FOUR-WAY FULL FLOATING 2)

116. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

117. Caterpillar has directly or indirectly, and willfully, infringed one or more claims of the ’316 patent by importing, making, distributing, using, offering to sell, or selling one or more of the Large Infringing Products manufactured at least before about October 2020.

118. Upon information and belief, Caterpillar’s customers that have purchased the Large Infringing Products manufactured at least before about October 2020 have and continue to engage in activities which constitute direct infringement of at least claims 4-7 and 13-14 of the ’316 patent, in violation of 35 U.S.C. § 271(a). For example, a PM622 was observed next to a road milling operation near Exit 6 of Interstate 110 outside El Paso, Texas.

Employees of Plote Construction have used a PM622 to perform road milling near the Roselle Road exit on Interstate 90 near Schaumburg, Illinois.

A PM822 was also observed operating in Louisiana.

119. Caterpillar has also posted at least two customer testimonial videos on YouTube, showing customers operating the Large Infringing Products. These customers include White Oak Asphalt of Fredericksburg, Virginia (https://www.youtube.com/watch?v=M2sinPf9laA) and Tri-City Blacktop of Bettendorf, Iowa (https://www.youtube.com/watch?v=vsgJpYQpv-c) .

120. Caterpillar has and is inducing infringement of the ’316 patent by actively and knowingly inducing purchasers of the Large Infringing Products manufactured at least before

about October 2020 to use them in a way that infringes claims 4-7 and 13-14 of the '316 patent, in violation of 35 U.S.C. § 271(b). Specifically, as described above, when operated at speeds above 0.12 mph, the Large Infringing Products manufactured at least before about October 2020 automatically engage positive hydraulic coupling of the cylinders, practicing at least claims 4-7 and 13-14 of the '316 patent.

121. Furthermore, Caterpillar literature provides guidelines for reducing vibration levels on earthmoving equipment instructing that to "[m]inimize vibrations for a long work cycle or a long travel distance" operators should "[u]se the ride control system." (D.I. 1-6 at 34.)

122. Claim 1 of the '316 patent is exemplary:

> A method of operating a road-building machine, comprising:
> (a) providing a road-building machine including:
> a chassis having a forward direction; a left front ground engaging support:
> a right front ground engaging support; a left rear ground engaging support;
> a right rear ground engaging support;
> a first working cylinder rigidly connected to the chassis and connected to the left front ground engaging support for adjusting a height of the left front ground engaging support relative to the chassis;
> a second working cylinder rigidly connected to the chassis and connected to the right front ground engaging support for adjusting a height of the right front ground engaging support relative to the chassis;
> a third working cylinder rigidly connected to the chassis and connected to the left rear ground engaging support for adjusting a height of the left rear ground engaging support relative to the chassis;
> a second working cylinder rigidly connected to the chassis and connected to the right rear ground engaging support for adjusting a height of the right rear ground engaging support relative to the chassis;
> a rotating working drum supported from the chassis between the front ground engaging supports and the rear ground engaging supports and extending transversely in the forward direction;
> each of the working cylinders including at least one working chamber filled with a pressure medium; and
> coupling lines connecting the working cylinders to one another and providing a positive hydraulic coupling between the working cylinders;
> (b) adjusting the height of the left front and right rear ground engaging supports in a first direction; and
> (c) adjusting the height of the right front and left rear ground engaging supports in a second direction opposite the first direction.

123. For the reasons discussed above in relation to claims 26 of the '309 patent, all the limitations of claim 1 of the '316 patent are met by the Large Infringing Products manufactured at least before about October 2020.

124. Exemplary dependent claims include claims 10 and 14.

125. Claim 10 recites as follows:

> The method of claim 1, further comprising:
> temporarily cancelling the positive hydraulic coupling between the working cylinders; and subsequently restoring the positive hydraulic coupling.

126. Claim 14 recites as follows:

> The method of claim 10, further comprising:
> during the temporarily cancelling step, lowering all of the ground engaging supports by the same amount.

127. The ride control system "must be turned ON and OFF depending on what machine functions are active." (D.I. 1-6 at 513.) For example, the Operation and Maintenance Manual for the PM620 and PM622 describes an "All Legs Lower" feature: "[w]hen the button is pressed, all leg heights are first equalized then all four legs retract at the same rate." (D.I. 1-6 at 50.) Due to the coupling arrangement described above, the only way to accomplish retraction of all four legs at the same rate is to cancel the positive hydraulic coupling between the working cylinders. Accordingly, the ride control system is deactivated when, for example, a RAISE or LOWER command is present and reactivated when absent. (*See* D.I. 1-6 at 49.)

128. Accordingly, all the claim limitations of claims 10 and 14 are met by the automatic deactivation and reactivation of the ride control system of the Large Infringing Products manufactured at least before about October 2020.

129. Caterpillar is or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the '316 patent.

130. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

131. Caterpillar Paving Products cited the '316 patent during prosecution of at least U.S. Patent Nos. 8,757,729 (issued June 24, 2014), 8,874,325 (issued October 28, 2014), and 8,973,688 (issued March 10, 2015), all of which were assigned to Caterpillar Paving Products at the time they issued.

132. Caterpillar was made aware of the '316 patent and its infringement thereof at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

133. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

134. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

135. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 3: INFRINGEMENT OF U.S. PATENT NO. 7,530,641
(DRIVING BACKWARDS)

136. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

137. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the '641 patent by importing, making, distributing, using, offering to sell, or selling one or more of the Large Infringing Products and/or one or more of the Compact Infringing Products.

138. As discussed above, Caterpillar's customers that have purchased the Infringing Products have and continue to engage in activities which constitute direct infringement of at least claims 11, 12, and 15-19 of the '641 patent, in violation of 35 U.S.C. § 271(a). For example, Caterpillar customers have and will operate the Infringing Products in a reverse direction of travel with the clutch coupling the engine to the milling drum engaged and with the milling drum in a raised position.

139. Caterpillar has and is inducing infringement of the '641 patent by actively and knowingly inducing purchasers of the Infringing Products to use those products in a way that infringes claims 11, 12, and 15-19 of the '641 patent, in violation of 35 U.S.C. § 271(b). The functionality described below is a safety feature inherent to operation of the Infringing Products. Thus, operation of the Infringing Products infringes at least claims 11, 12, and 15-19 of the '641 patent.

140. Claim 11 of the '641 patent is exemplary:

> Method for working ground surfaces (2) with a construction machine (1) that is automotive by means of traveling devices (8) and in which a milling drum (12) supported in a machine frame (4) is driven by a drive engine (6),
> where the milling drum (12) is moved into a raised position when it is not in milling mode,
> characterized in that,
> the milling drum (12) remains coupled with the drive engine (6) when in raised position and with a direction of travel in which the rotating direction of the milling drum (12) corresponds to the rotating direction of the traveling devices (8),
> in that a distance is monitored between the rotating, raised milling drum (12) and the ground surface (2) or an obstacle located in front of the milling (12) when seen in the direction of travel, and
> in that the milling drum (12) is uncoupled from the drive engine (6), and/or the traveling devices (8) are uncoupled from the drive engine (6) and/or the machine frame (4) is raised and/or an alarm signal is generated when detecting that the deviation falls below a pre-determined distance between the milling drum (12) and the ground surface (2).

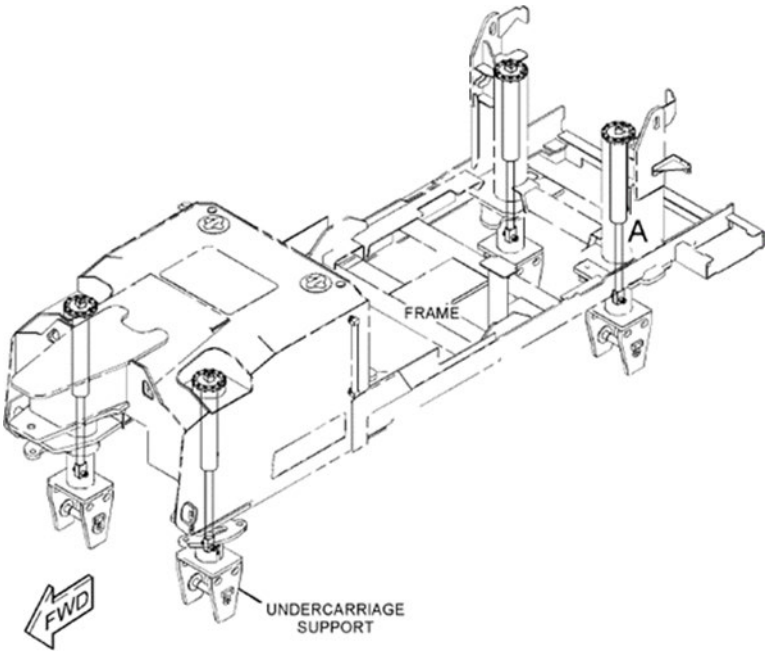
141. The Infringing Products are automotive construction machines for working

ground surfaces (i.e., milling or cold planing) that have traveling devices (e.g., caterpillars).

(D.I. 1-1 at 260 (exemplary of Large Infringing Products).)

(Ex. 41 at 3 (exemplary of Compact Infringing Products).)

142. The Infringing Products have a machine frame.



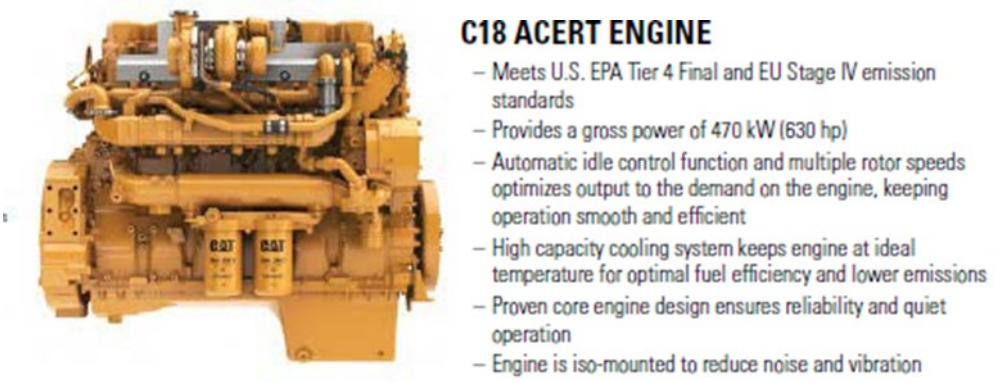
(D.I. 1-4 at 24 (exemplary of Large Infringing Products).)

143. The Infringing Products have a milling drum supported in a machine frame.

(D.I. 1-1 at 245 (exemplary of Large Infringing Products).)

(Ex. 42 at 5) (exemplary of Compact Infringing Products).)

144. The Infringing Products have a drive engine for driving the milling drum. The engine drives the machines' powertrain, including the rotor. (D.I. 1-1 at 244.)



(D.I. 1-1 at 244 (exemplary of Large Infringing Products).)

ENGINE	
Engine Model	Cat C9.3
Gross Engine Power – SAE J1995	
U.S. EPA Tier 4 Final, EU Stage V, Korea Tier 4 Final	251 kW 336.6 hp
Brazil MAR-1, equivalent to U.S. EPA Tier 3 and EU Stage IIIA	246 kW 330 hp
Operating Speed	33 m/min 108 ft/min
Maximum Travel Speed – Track	5.5 km/h 3.4 mph
Maximum Travel Speed – Wheel	7.5 km/h 4.7 mph

(Ex. 42 at 14 (exemplary of Compact Infringing Products).)

145. The engine drives the milling drum through a "rotor drive system." (D.I. 1-1 at 248-49.)

(D.I. 1-1 at 249 (depicting the working drum under the heading "Cutting System") (exemplary of Large Infringing Products).)

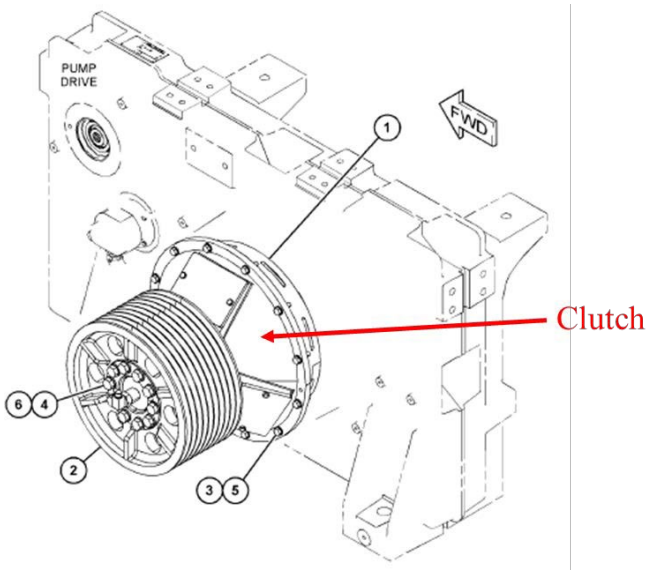
(Ex. 42 at 10 (exemplary of Compact Infringing Products).)

146. The milling drum is capable of being raised when it is not in milling mode. As discussed above in relation to the '309 and '316 patents, the caterpillars are adjustable in height in relation to the machine frame. Thus, by increasing the height of the machine frame relative to the caterpillars, the milling drum is raised. For example,

> Leg position sensors (9), (10), (11), and (12) allow machine ECM (2) to monitor the vertical position of the machine to control the rotor cut depth. Five preset leg positions are associated with the leg elevation system as follows:

(D.I. 1-6 at 238.)

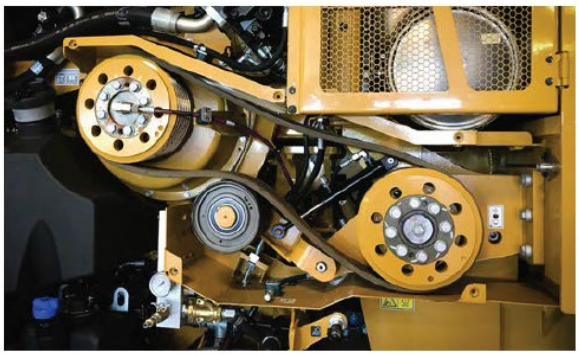
147. The drive engine is operatively coupled to the milling drum via a heavy-duty dry clutch (D.I. 1-1 at 249) that engages a belt drive, which in turn drives the milling drum.



(D.I. 1-3 at 179 (the clutch, part # 374-1350, is designated as "1") (exemplary of Large Infringing Products).)

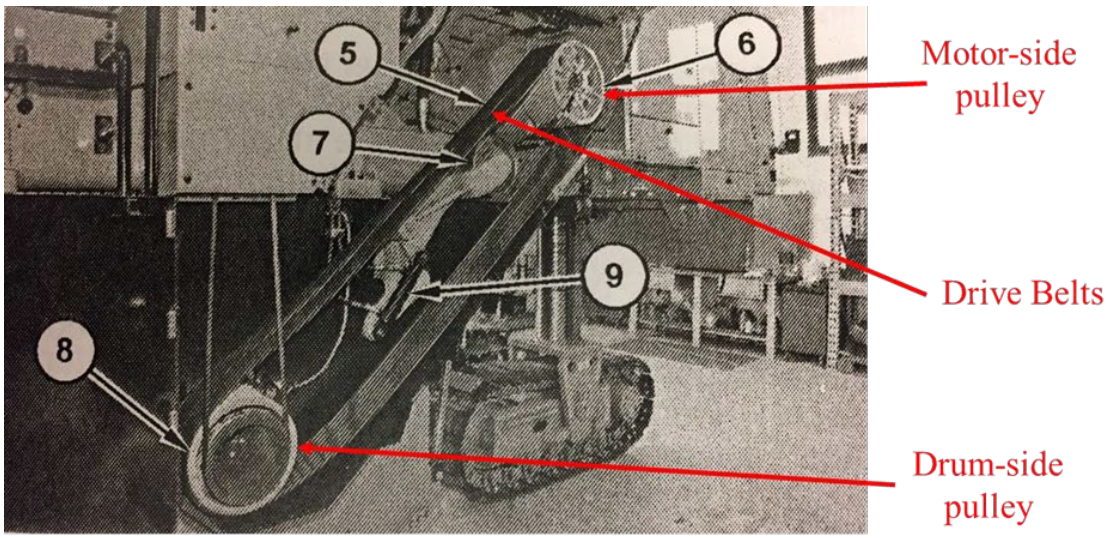
DURABILITY DESIGNED IN

The rotor drive system features a heavy-duty dry clutch, dual stage belt drive and automatic belt-tensioning to prevent slippage. A reinforced cutting chamber enhances durability to areas exposed to high abrasion.

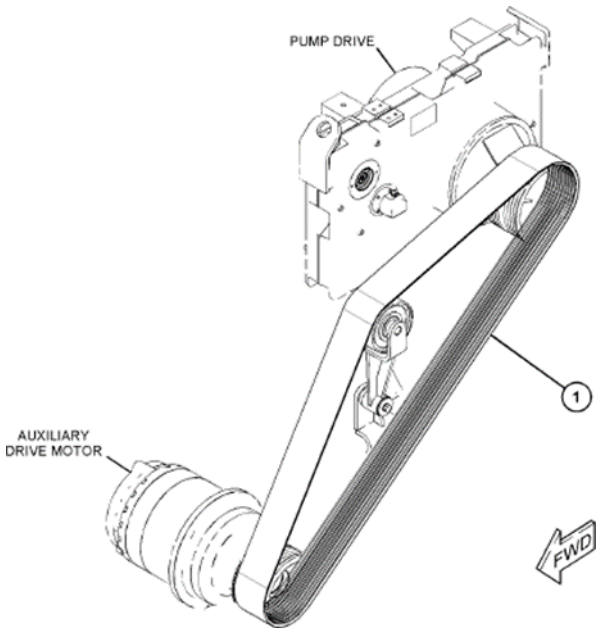


(Ex. 42 at 6 (exemplary of Compact Infringing Products).)

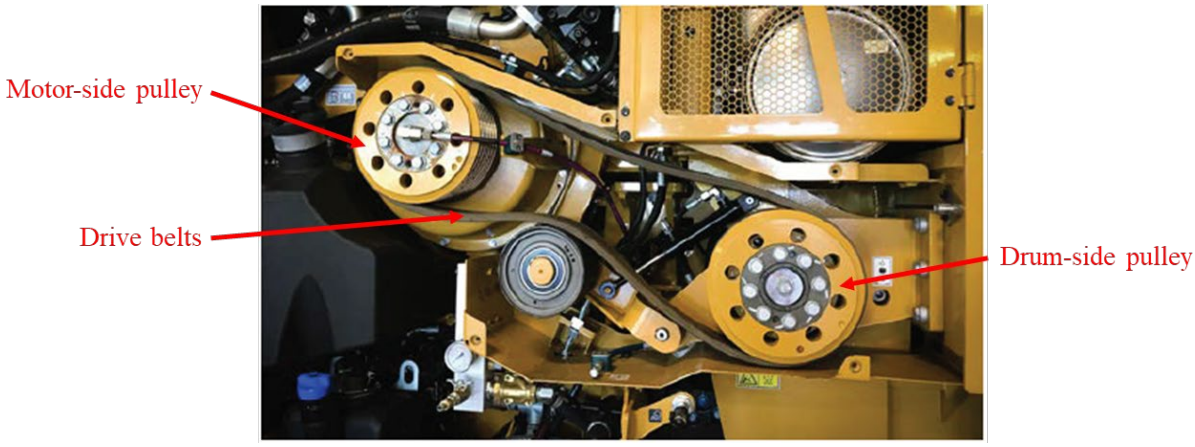
148. The belt dive includes motor-side pulley, a drum-side pulley, and multiple drive belts connecting the motor-side pulley to the drum-side pulley.



(D.I. 1-6 at 276 (exemplary of Large Infringing Products).)



(D.I. 1-3 at 176 (exemplary of Large Infringing Products).)



(Ex. 42 at 6 (exemplary of Compact Infringing Products).) The clutch can uncouple the traction drive from the drive engine, thereby uncoupling the milling drum from the drive engine. For example, the Operator Console has a button that allows the operator to turn the rotor drive on and off. (D.I. 1-6 at 59.)

> The machine is equipped with a large rotor drum with numerous carbide cutting bits. Diamond cutting bits are available as an option. The rotor is mechanically driven by the engine through a dry clutch, twin belts, and planetary gear unit.
>
> The hydraulically actuated clutch engages and disengages the rotor drive. The twin belt drive system is equipped with a hydraulic tensioner to maintain proper rotor drive tension during operation. Oil flow to operate the rotor clutch actuator and the belt tensioning cylinder is provided by the auxiliary hydraulic pump.

(D.I. 1-6 at 274.)

149. As contemplated by the '641 patent, a machine is in milling mode when the milling drum is working the ground surface. The milling drum preferably mills the ground in up-milling mode. In other words, when in milling mode, the drum rotates in the opposite direction of travel, as demonstrated by Figure 1 of the '641 patent.

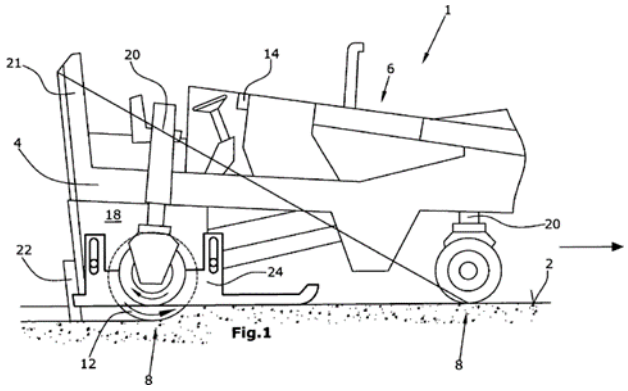


Fig.1

(D.I. 1-1 at 51.)

150. As noted above, the milling drum can be raised when it is not in milling mode.

> Leg position sensors (9), (10), (11), and (12) allow machine ECM (2) to monitor the vertical position of the machine to control the rotor cut depth. Five preset leg positions are associated with the leg elevation system as follows:

(D.I. 1-6 at 238.) Although not working the ground surface, the milling drum remains coupled to

the drive engine and continues to rotate at milling mode speed.

> The transmission ECM controls the rotor operation. To engage the rotor, several parameters must be met. Before engagement begins, the propel system must be in neutral, the rotor door must be closed, and the engine speed must be below 850 rpm. Once engaged, three speeds are available for rotor operation.

(D.I. 1-6 at 274.) With the milling drum raised, the Infringing Products can be driven in reverse, at which point the rotation of the milling drum in up-milling mode corresponds to the rotating direction of the caterpillar tracks. This operating mode corresponds to Figure 2 of the '641 patent. (*See* D.I. 1-1 at 52.)

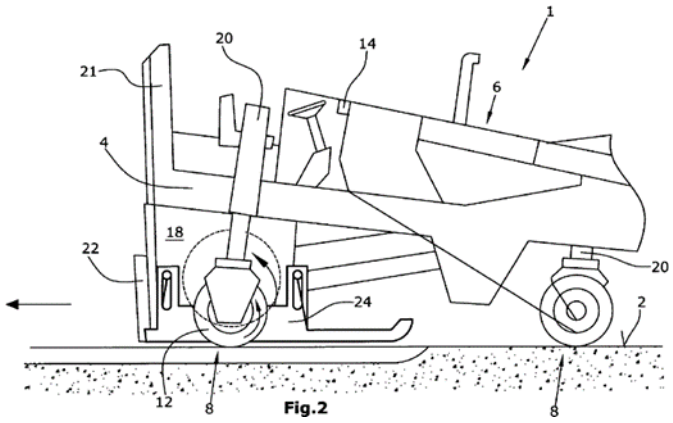


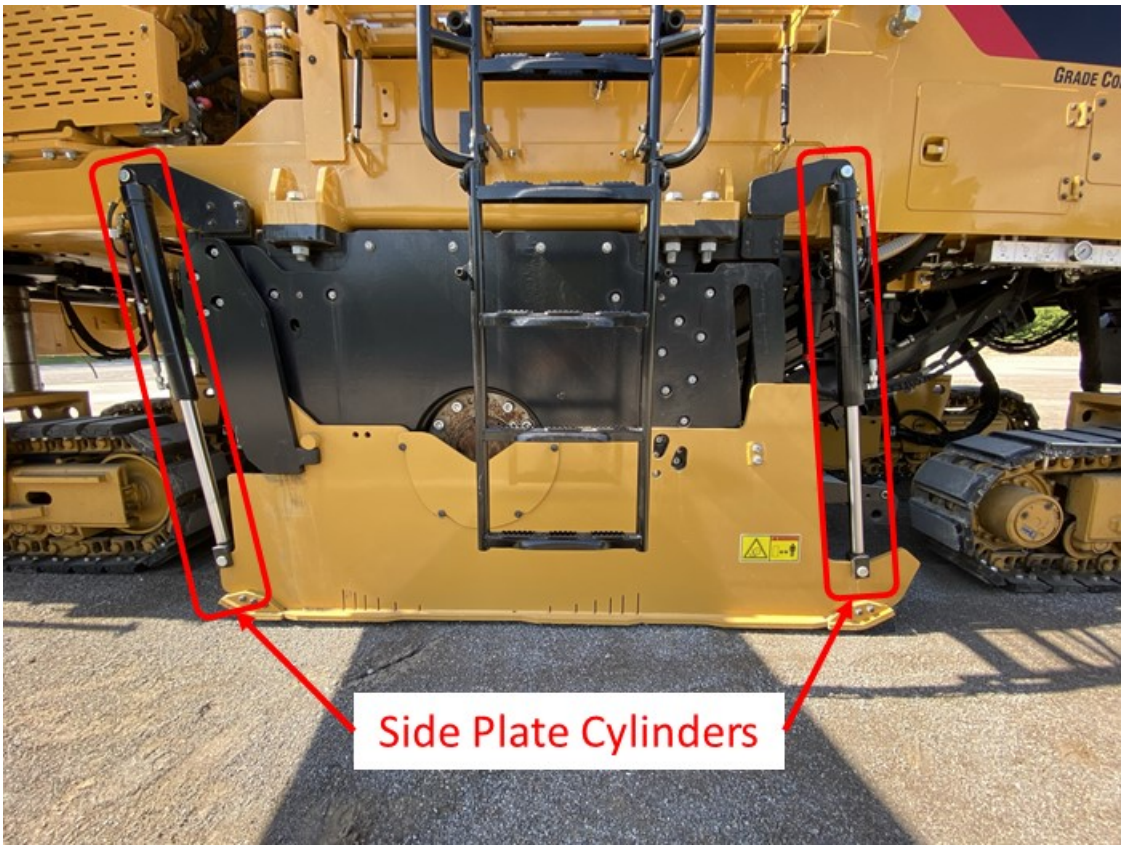
Fig.2

151. The Infringing Products monitor a distance between the milling drum and the ground surface via one or more of the side plate position and/or the scraper ("moldboard") position.

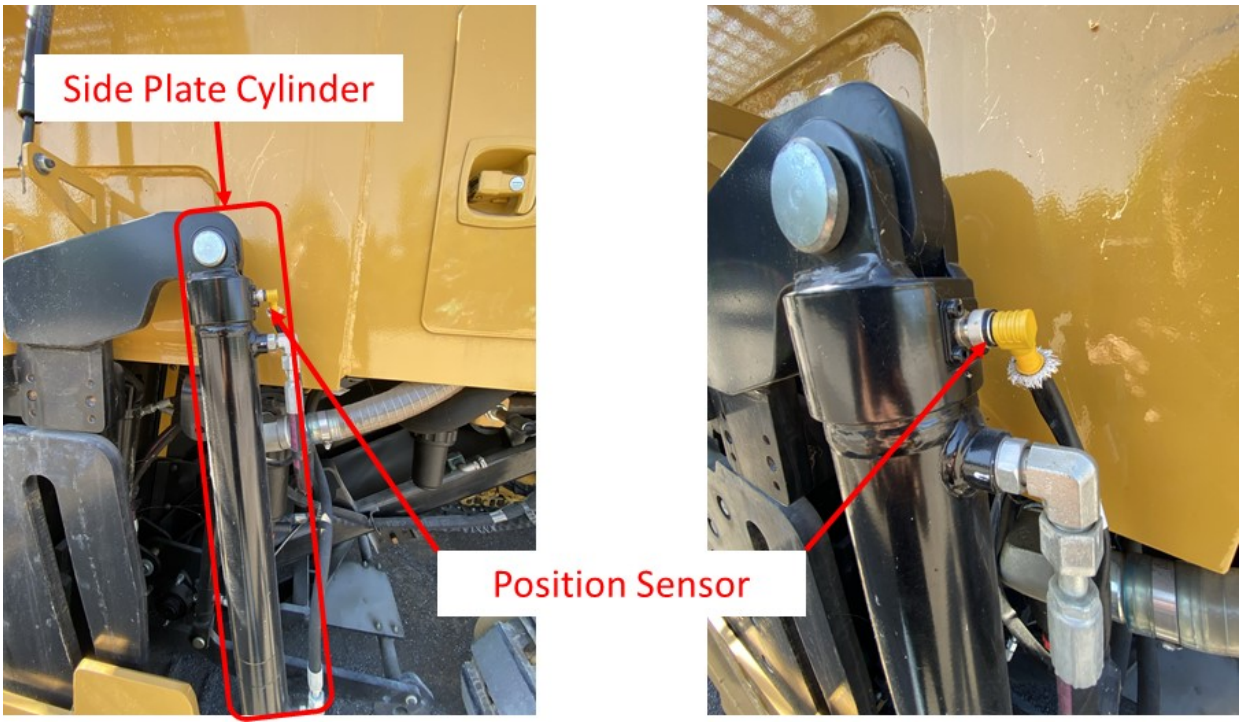
152. The Large Infringing Machines utilize position-sensing cylinders for monitoring the side plate position.

> Side plate position sensor (16) is installed in each side plate cylinder. The cylinders are at the front and rear of the side plates. The left front position sensor is shown in Illustration 14 .
>
> Side plate position sensor (16) is a linear sensor that sends a pulse-width modulated (PWM) signal directly to the transmission ECM. These sensors transmit the vertical position of the side plates. The signal is used to set a reference level and to determine the rotor cut depth for each side of the machine.

(D.I. 1-6 at 224.) The photographs below show the side plate cylinders at the front and rear of the side plates as observed on a PM620 manufactured at least on or before about December 2018.



The photographs below further show a PM620 manufactured at least on or before about December 2018 having the side plate position sensor in the side plate cylinder for monitoring a distance between the milling drum and the ground.



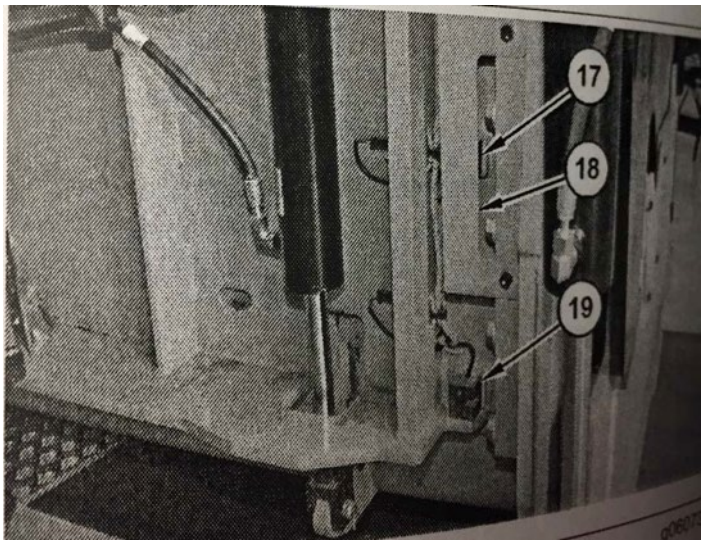
The Large Infringing Machines utilize proximity switches for monitoring the moldboard position.

The moldboard position is determined by switches mounted to the rotor service door and a plate mounted to the moldboard. These components are accessed at the rear of the cutter chamber.

Moldboard raised switch (17) and moldboard lowered switch (19) are magnetic switches. These normally open switches are monitored by the steering ECM. As trigger plate (18) passes over a switch, the switch closes and changes state in the ECM logic. The combined state of the switches resolves the moldboard location. The position of the moldboard is determined as follows:

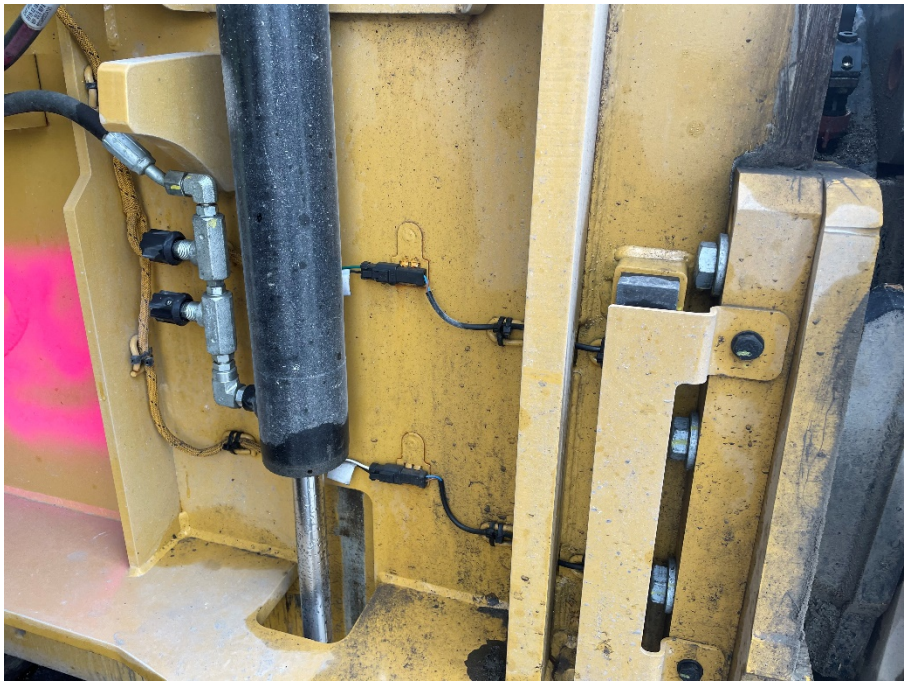
- When the moldboard is fully lowered, moldboard lowered switch (19) is closed. In this position, the state of moldboard raised switch (17) is disregarded.
- When the moldboard is in the intermediate travel range, moldboard lowered switch (19) is open and moldboard raised switch (17) is closed.
- When the moldboard is raised to the upper operating limit, both moldboard lowered switch (19) and moldboard raised switch (17) are open.

(D.I. 1-6 at 224-25.) The photograph below also shows the arrangement of the switches (designated "17" and "19") and trigger plate (designated "18") in the Large Infringing Products.



(D.I. 1-6 at 224.) A similar arrangement was observed on a PM620 manufactured at least on or before about December 2018.

A similar arrangement was also observed on a PM825 manufactured at least after about October 2020.



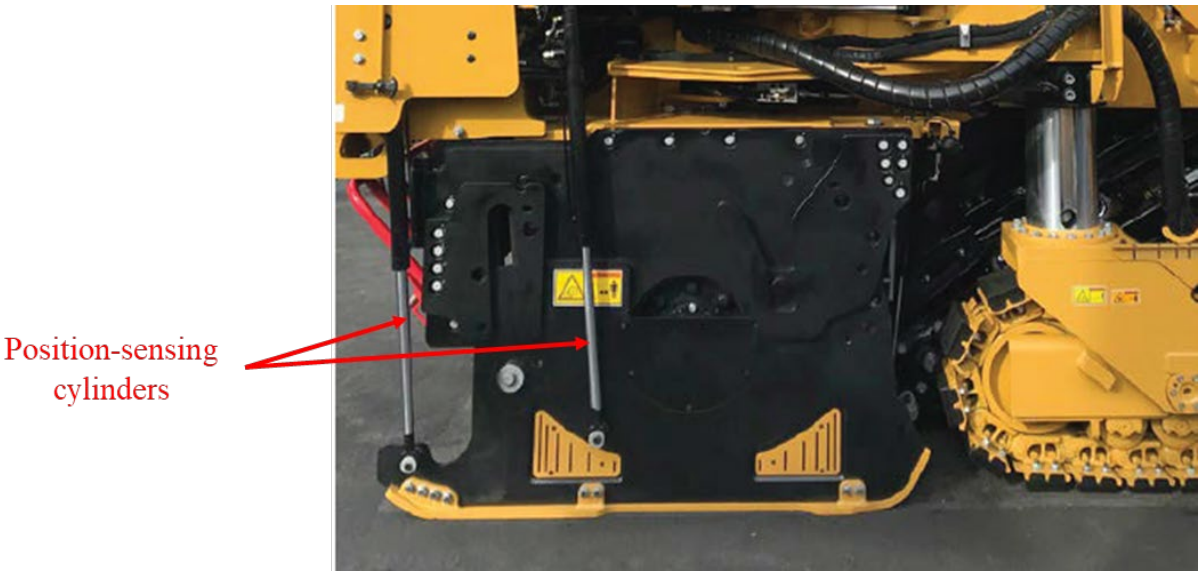
153. The combination of the moldboard, proximity switches, and trigger plate constitute a monitoring device that monitors a distance between the milling drum and the ground surface. When driving the Large Infringing Machines in reverse with the milling drum raised and rotating in the upmilling direction, if the lower part of the moldboard is pushed up by engagement with the ground surface, the proximity switch detects movement of the trigger plate. In this way, the moldboard senses the ground surface, and, in combination with the proximity switches, monitors the distance between the raised milling drum and the ground surface.

154. The Compact Infringing Machines utilize a position-sensing hydraulic cylinder to monitor the height of the moldboard, as depicted in the photograph below.

(Ex. 42 at 6.)

155. The combination of the moldboard and the position-sensing cylinder constitutes a monitoring device that monitors a distance between the milling drum and the ground surface. When driving the Compact Infringing Machines in reverse with the milling drum raised and rotating in the upmilling direction, if the lower part of the moldboard is pushed up by engagement with the ground surface, the position-sensing cylinder detects that movement. In this way, the moldboard senses the ground surface, and, in combination with the hydraulic cylinder, monitors the distance between the raised milling drum and the ground surface.

156. The Compact Infringing Machines also utilize position-sensing hydraulic cylinders to monitor the height of the side plates, as depicted in the photograph below.



(Ex. 42 at 6.)

157. The automatic rotor disengagement feature of the Infringing Products monitors the moldboard and side plate position to determine when to disengage the rotor. Upon sensing engagement of the moldboard with the ground surface, the Infringing Products disengage the clutch, effectively uncoupling the raised milling drum from the drive engine.

> An automatic rotor disengagement feature detects a condition where the rotor could come in contact with a surface while the machine is traveling in reverse. If this rotor exposure condition is detected, the rotor drive is disengaged. For this feature, side plate sensors (9), (10), (11) and (12), and the moldboard position are monitored. Steering ECM (1) monitors the left side plate sensors and the moldboard position. Transmission ECM (2) monitors the right side plate sensors.

(D.I. 1-6 at 284.) The rotor disengagement occurs via disengagement of the clutch.

> **Rotor Disengagement**
>
> A rotor disengagement command is initiated by pressing and releasing either rotor control switch. When this command is received, transmission ECM (2) immediately de-energizes rotor clutch solenoid (13). This action disengages the rotor clutch.

(D.I. 1-6 at 283.) This occurs when (1) the Infringing Products are operating in reverse, (2) the rotor drive status is "on," and (3) "[t]he moldboard status changes to 'Not Lowered.'" (*See* D.I. 1-6 at 284.)

158. The automatic rotor disengagement feature also generates an alarm signal when the monitoring device detects a deviation that falls below a pre-determined distance.

> The side plate raised threshold is based on the duty cycle of the position sensors. If the duty cycle of either left side plate sensor (9) and (10) is less than 78.9 percent, an event is detected. If the duty cycle of either right side plate sensor (11) and (12) is less than 81.4 percent, an event is detected.
>
> When an event is detected, a Level 2 warning is activated for 5 seconds and is logged. The rotor drive status changes to "Disengaging" and the normal disengagement sequence is initiated. When the rotor disengagement feature is activated, the machine is allowed to continue to travel in reverse.

(D.I. 1-6 at 284.)

159. Accordingly, all the limitations of claim 11 of the '641 patent are met by the Infringing Products.

160. Exemplary dependent claims include claims 15 and 17.

161. Claim 15 recites as follows:

> Method in accordance with claim 11, characterized in that the milling drum (12) is raised by a pre-determined amount that is larger than a minimum distance between the milling drum (12) and the ground surface (2), and in that a sensing device measuring towards the ground surface (2) takes a lower limit position which corresponds to a pre-determined distance or to a minimum distance to be maintained between the milling drum (12) and the ground surface (2).

162. The operator may raise or lower the moldboard by pressing a button, thereby setting a pre-determined distance between the raised milling drum and the ground surface. (*See* D.I. 1-6 at 50.)

163. Thus, taken together with allegations as to claim 1, the Infringing Products meet

all the limitations of claim 15.

164. Claim 17 recites as follows:

> Method in accordance with claim 15, characterized in that a scraper blade (22) that is arranged behind the milling drum (12) when seen in the direction of travel is used as a sensing device.

165. As noted above, the scraper blade of the Infringing Products is arranged behind the milling drum when seen in the direction of travel and is used as a sensing device.

166. Thus, taken together with allegations as to claim 1, the Infringing Products meet all the limitations of claim 17.

167. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the '641 patent.

168. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

169. Caterpillar Paving Products Inc. cited the '641 patent during prosecution of U.S. Patent No. 8,888,194 ("the '194 patent") (issued November 18, 2014), and assigned to Caterpillar Paving Products Inc. The examiner cited the '641 patent during prosecution. Furthermore, the specification of the '194 patent itself discusses the '641 patent's approach to avoiding collisions when driving backwards with the milling drum raised and rotating:

> U.S. Patent Application Publication No. 2007/0286678 (U.S. Pat. No. 7,530,641) relates to an automotive construction machine for working on ground surfaces. The automotive construction machine includes a machine frame, an engine for driving traveling devices and working devices. The automotive construction machine further includes a milling drum for milling the ground surfaces, which can be raised, driven by, and can be uncoupled from a drum drive. The milling drum can be moved to a raised position when not in milling mode. When raised, the milling drum rotates and remains coupled with the drive engine. A monitoring device monitors the distance between the milling drum and the ground surface and uncouples the raised milling drum from the drive engine when the distance falls below a pre-determined distance.

170. Caterpillar Paving Products Inc. cited the ’641 patent during prosecution of U.S. Patent No. 10,776,638 (“the ’638 patent”) (filed December 18, 2018), and assigned to Caterpillar Paving Products Inc. The sole named inventor of the ’638 patent is Eric Engelmann, who served as one of Caterpillar’s corporate witnesses during the 1067 Investigation regarding the operation of the Large Infringing Products. Furthermore, the ’638 patent specification itself discusses the ’641 patent’s approach to avoiding collisions when driving backwards with the milling drum raised and rotating:

> One attempt to address this issue is described in U.S. Pat. No. 7,530,641 to Berning et al., and issued on May 12, 2009. The '641 patent describes a construction machine that monitors the distance between a milling drum and a ground surface and uncouples the raised milling drum from a drive engine, or uncouples traveling devices from the drive engine, or raises the machine frame or generates an alarm signal when the monitoring device detects a deviation that falls below a pre-determined distance.

171. Caterpillar was also made aware of the ’641 patent and its infringement thereof at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

172. On October 1, 2018, the administrative law judge issued an FID concluding that, assuming they are driven in reverse in the United States, the use of Caterpillar’s Large Infringing Products by its customers directly infringes valid claims 11 and 17 of the ’641 patent.

173. The Federal Circuit later vacated the ITC’s determination that Caterpillar did not induce infringement of claims 11 and 17 of the ’641 patent.

174. Caterpillar has never challenged the validity of claims 11 and 17 of the ’641 patent.

175. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

176. Any continued assertions by Caterpillar that claims 11 and 17 of the ’641 patent

are invalid or that the Large Infringing Products do not infringe claims 11 and 17 of the '641 patent would render this case exceptional under 35 U.S.C. § 285 and would constitute unreasonable and vexatious multiplication of the proceedings under 28 U.S.C. § 1927.

177. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

178. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 4: INFRINGEMENT OF U.S. PATENT NO. 8,113,592
(PATH MEASUREMENT 1)

179. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

180. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the '592 patent by importing, making, distributing, using, offering to sell, or selling one or more of the Large Infringing Products.

181. Caterpillar has engaged in activities which constitute direct infringement of at least claims 1, 2, 5-15, and 18-22 of the '592 patent, in violation of U.S.C. § 271(a).

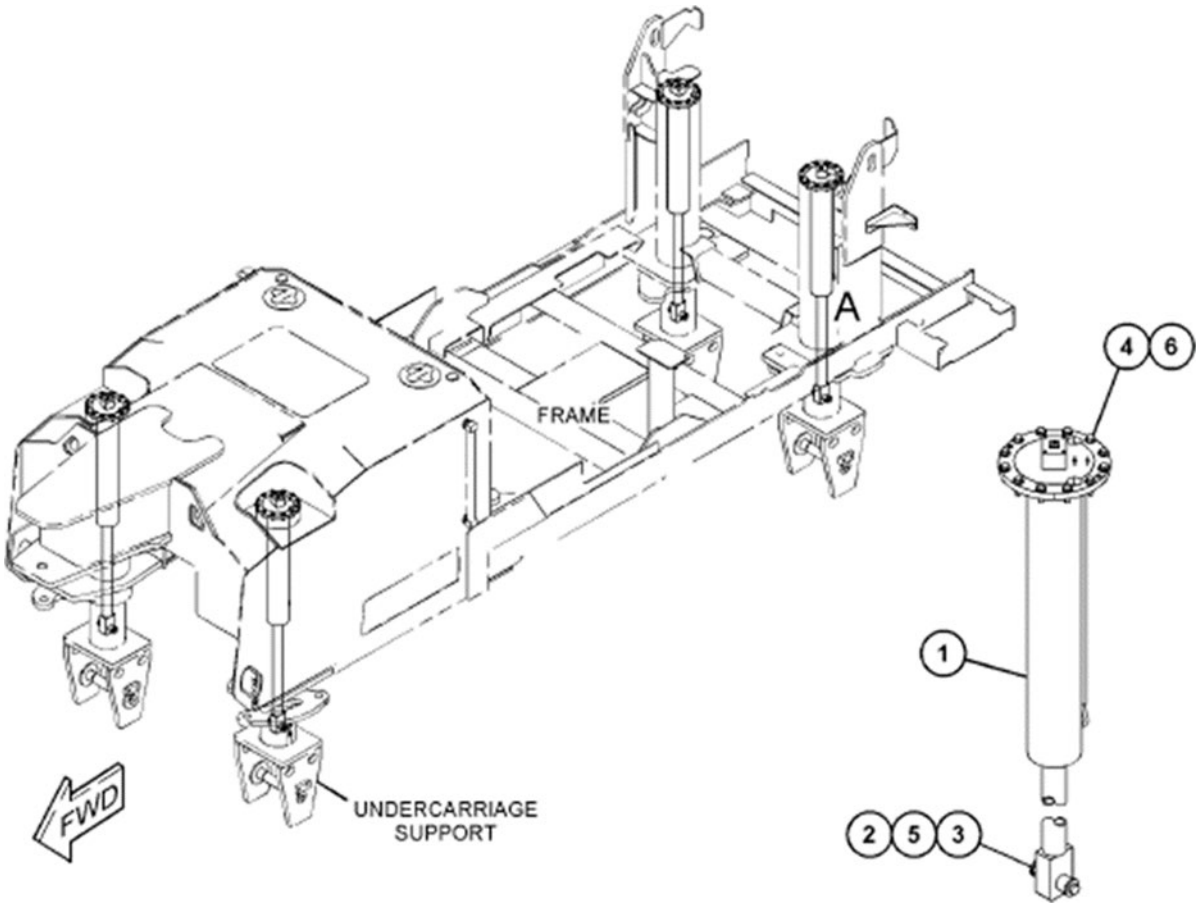
182. Claim 1 of the '592 is exemplary:

> A road construction machine, comprising: a machine frame;
> a working drum supported from the machine frame for working a ground surface or traffic surface;
> a plurality of ground engaging supports for supporting the construction machine on the ground surface or traffic surface;
> a plurality of lifting columns, each one of the lifting columns being connected between the machine frame and one of the ground engaging supports, each one of the lifting columns including two telescoping hollow cylinders and at least one piston-cylinder unit located within the telescoping hollow cylinders for adjusting a height of the lifting column so that each one of the lifting columns is

> individually adjustable in height relative to the machine frame, each lifting column having a lifting position corresponding to a position of one of the two telescoping hollow cylinders relative to the other of the two telescoping hollow cylinders;
>
> a plurality of lifting position measuring devices, each lifting position measuring device being coupled with elements of one of the lifting columns, which elements are capable of being displaced relative to one another in accordance with the lifting position of the lifting column in such a manner that a path signal pertaining to the lifting position of the lifting column is continuously detectable by the measuring device; and
>
> a controller operably connected to the lifting position measuring devices to receive the path signals from the lifting position measuring devices, the controller being operable to regulate the lifting positions of the lifting columns in response to the path signals detected by the lifting position measuring devices.

183. As discussed previously, the Large Infringing Products are road construction machines, with a machine frame, a working drum (milling drum) supported from the machine frame for working ground surfaces (i.e., milling or cold planning), and a plurality of ground engaging supports (caterpillars) for supporting the construction machine on the ground surface or traffic surface.

184. The Large Infringing Products have a plurality of lifting columns, each connected between the machine frame and one of the ground engaging supports.



(D.I. 1-4 at 24.) Each of the working cylinders can be actuated to adjust the height of the attached caterpillar relative to the chassis.

STABLE PLATFORM

– Four leg posts with position sensors independently adjust and provide powered vertical movement to maintain desired height

(D.I. 1-1 at 245.)

185. Each of the lifting columns includes two telescoping hollow cylinders.

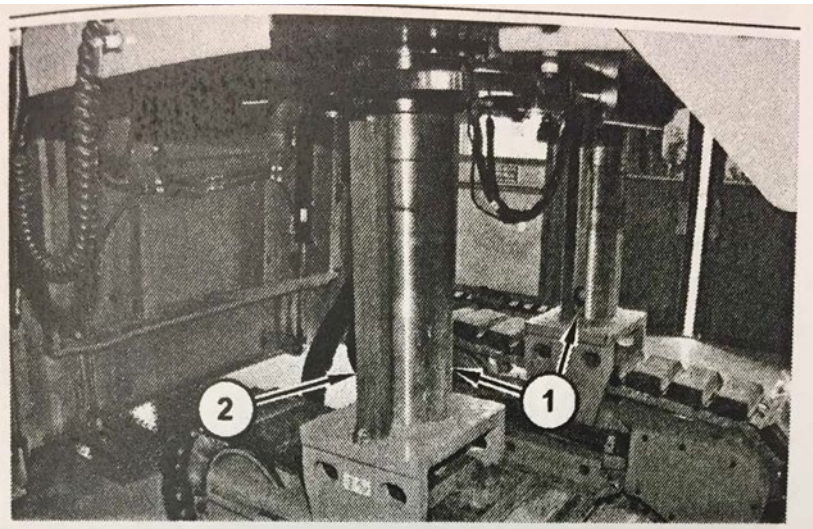


Illustration 33 g06073155

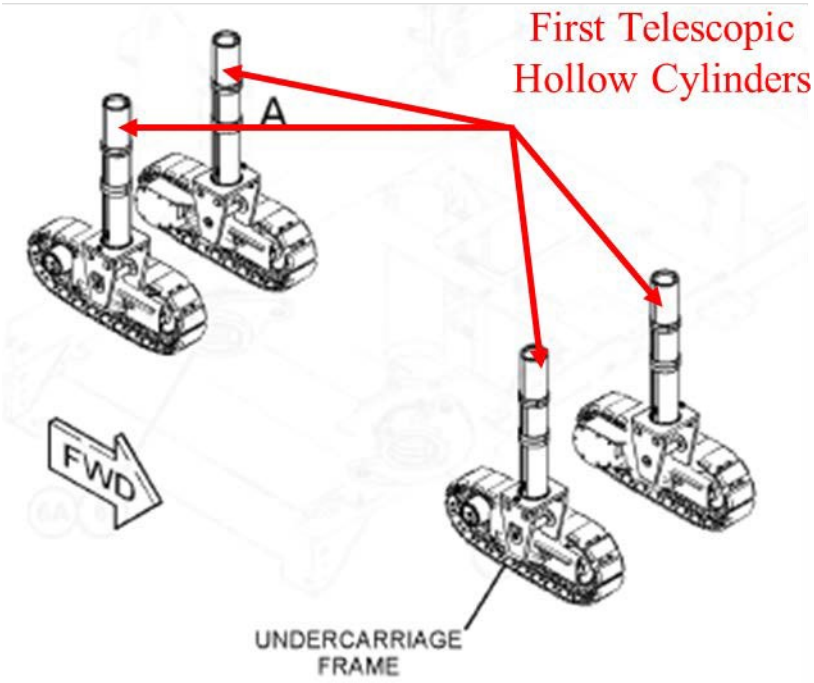
Machine Corners

(1) Leg elevation cylinders
(2) Cylinder service locks

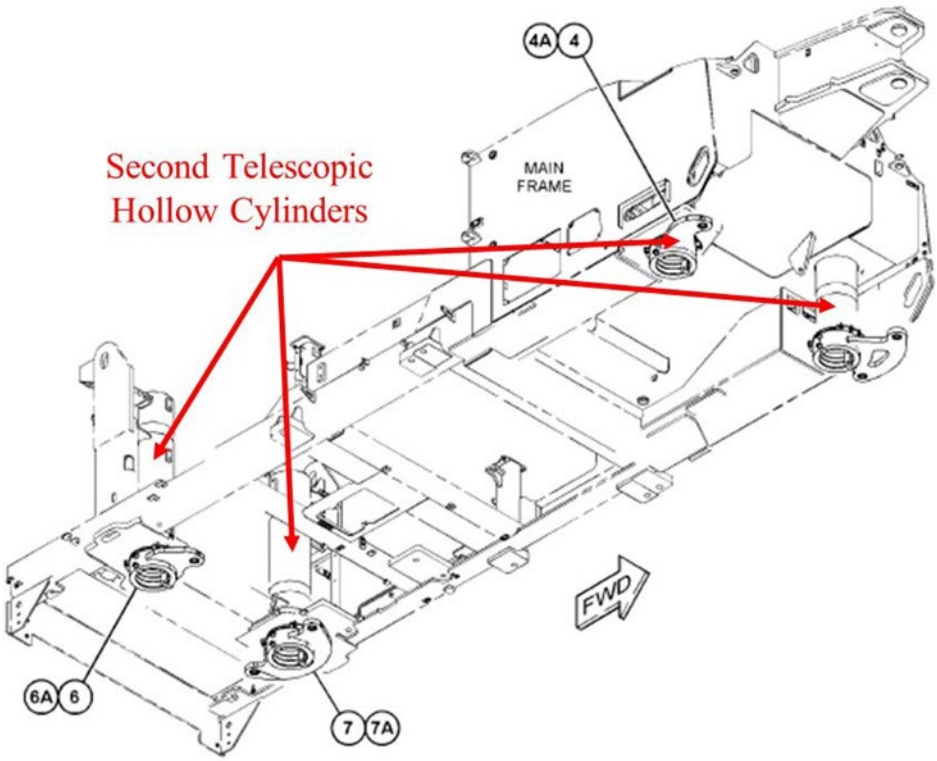
The machine stands on four leg elevation cylinders (1). The cylinders are at the front and rear of the machine. The rear leg cylinders are shown in Illustration 33 .

Leg elevation cylinders (1) hydraulically controlled to adjust the height and attitude of the machine. The machine is leveled or adjusted for grade and slope using these cylinders.

(D.I. 1-6 at 233.) The figure below shows the first of the two telescoping hollow column members.

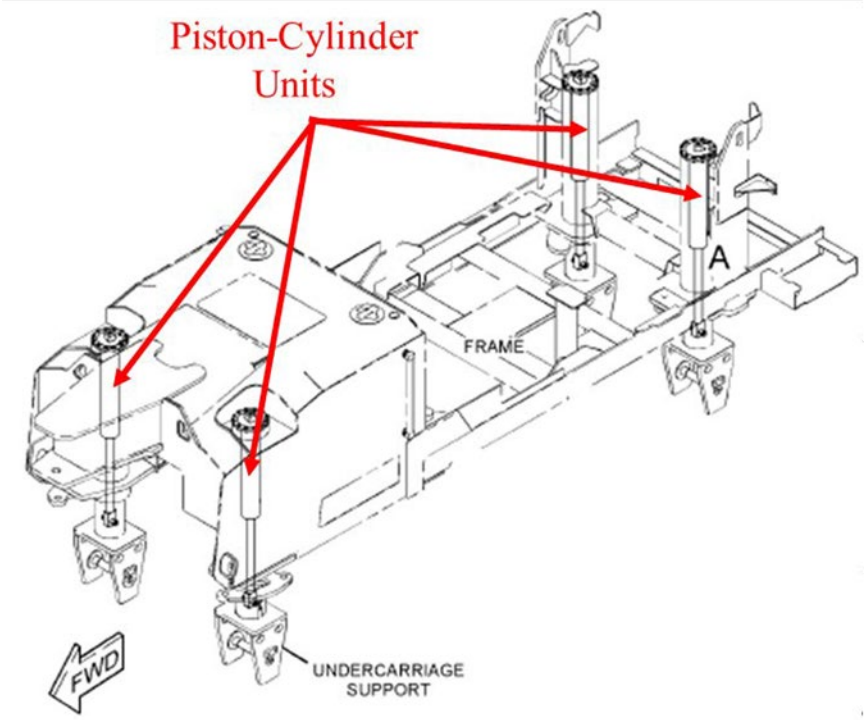


(D.I. 1-4 at 2.) The figure below shows the second of the two telescoping hollow column members.



(D.I. 1-4 at 13.)

186. At least one piston-cylinder unit is located within each telescoping hollow cylinders.



(D.I. 1-4 at 24 (designating the piston-cylinder units as "CYLINDER GP – HYDRAULIC").) Actuation of the piston-cylinder unit causes telescoping of the hollow cylinders relative to one another to allow individual adjustment in height of the lifting columns relative to the machine frame.

During an all-legs LOWER command, left front leg control valve (14) and right front leg control valve (16) shift. This action directs oil to the rod end of front elevation cylinders (2) and (5). Rear leg control valve (22) and rear leg speed valve (21) also shift. This action directs oil to the rod end of rear elevation cylinders (6) and (9).

> In the front leg circuits, oil from control valves (14) and (16) is directed to shuttle valve (13) in each circuit. The shuttle valves direct the cylinder actuation pressure to one side of compensator valves (15). This pressure acts to open the compensator valve allowing full supply oil flow to the front leg cylinders.
>
> In the rear leg circuit, oil flow to the rear leg cylinders is controlled by rear leg speed valve (21). During the all legs LOWER command, the speed valve is adjusted by the machine ECM. The ECM monitors the leg cylinder position sensors for elevation location and speed. The ECM controls the rear leg speed valve to match front and rear leg elevation changes.

(D.I. 1-6 at 255-56.)

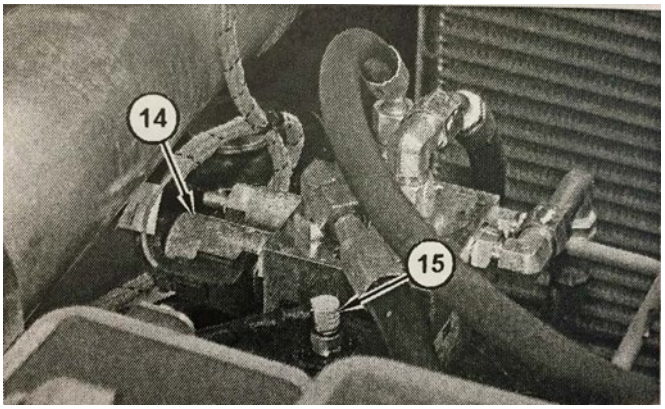
187. For the Large Infringing Machines manufactured at least before about October 2020, each lifting column has a lifting position corresponding to a position of one of the two telescoping hollow cylinders relative to the other of the two telescoping hollow cylinders. The Service Manual describes various lifting positions, or "leg positions", as corresponding to extensions of the hydraulic cylinders in association with the telescoping column members.

> The ECM uses the sensor signals to determine 5 preset leg positions as follows:
>
> - In the SERVICE HEIGHT (fully extended) position, the cylinder extension is 708.0 mm (27.9 inch) and the PWM signal from the sensor is 89.8 percent.
> - In the PRE-SERVICE position, the cylinder extension is 658.0 mm (25.9 inch) and the PWM signal from the sensor is 84.1 percent.
> - In the PRE-SCRATCH position, the cylinder extension is 419.0 mm (16.5 inch) and the PWM signal from the sensor is 57.2 percent.
> - In the SCRATCH position, the cylinder extension is 369.0 mm (14.5 inch) and the PWM signal from the sensor is 51.6 percent.
> - In the fully retracted condition, the cylinder extension is 0.0 mm (0.0 inch) and the PWM signal from the sensor is 10.0 percent.

(D.I. 1-6 at 224.)

188. As suggested above, the lifting position of each lifting column is determined by a lifting position sensor coupled with elements of the lifting column that uses a pulse-width modulated (PWM) signal to communicate the lifting position to an electronic control module (ECM).

Leg position sensor (15) is a linear sensor that sends a pulse-width modulated (PWM) signal directly to the machine ECM. These sensors allow the ECM to monitor the vertical position of the machine to control the rotor cut depth.



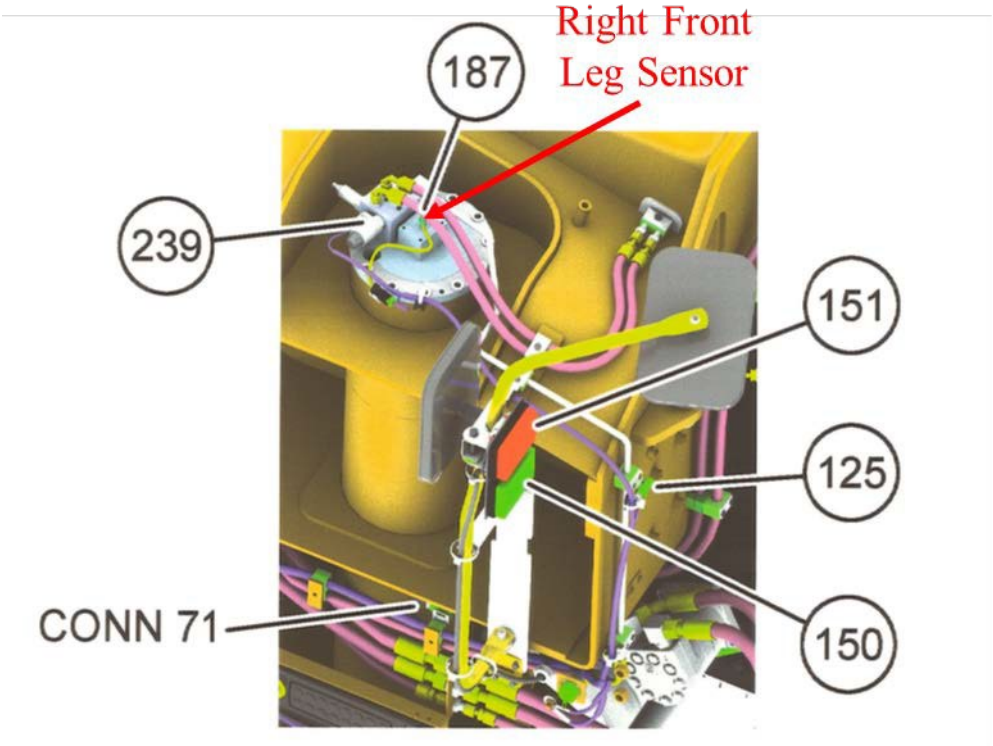
(D.I. 1-6 at 224.)

- Leg position sensors (9), (10), (11), and (12) are embedded in the four leg cylinders. Using a PWM signal, the sensors communicate actual leg position directly to the machine ECM.

(D.I. 1-6 at 237.)

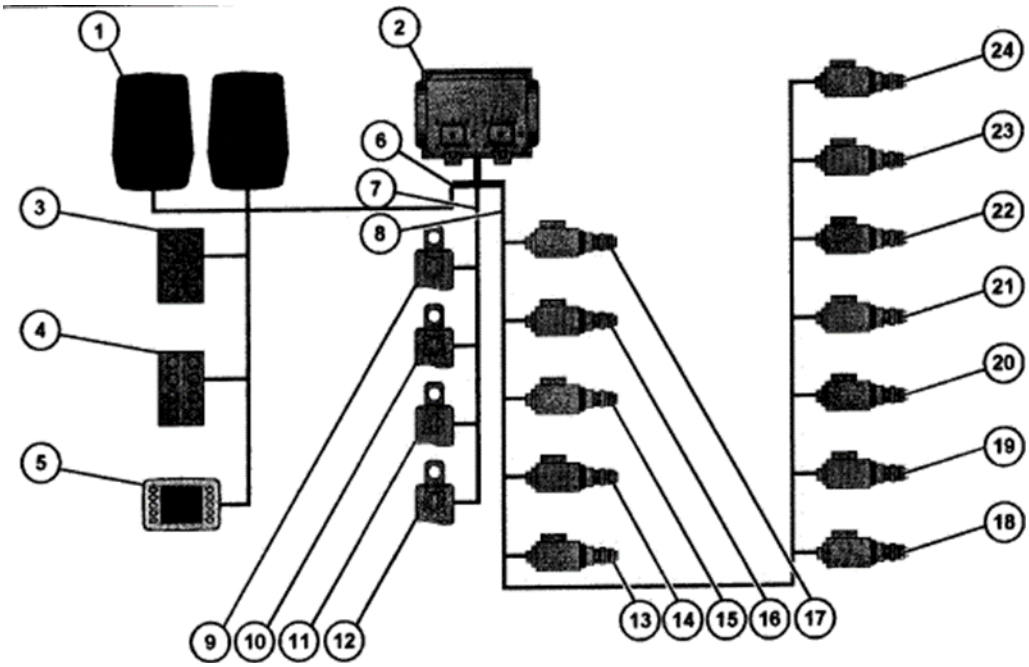
Leg position sensors (9), (10), (11), and (12) allow machine ECM (2) to monitor the vertical position of the machine to control the rotor cut depth. Five preset

(D.I. 1-6 at 238.) The right front leg is schematically highlighted below, along with right front leg height sensor (187) embedded in the respective leg cylinder.



(D.I. 1-6 at 715, Schematic for PM620 and PM622 Cold Planar, Electrical System, Volume 2 of 4: Platform and Chassis.) The right rear leg height sensor, left front leg height sensor, and left rear leg height sensor are similarly configured according to the same schematic volume. The photograph below shows the measurements of extension in millimeter units as displayed on the operator's display corresponding to each of the leg height sensors.

189. Thus, these sensors provide a path signal pertaining to the lifting position of the lifting column to the ECM. A diagram of the electrical components of the machine elevation control system is reproduced below.



(D.I. 1-6 at 237.)

Machine ECM (2) analyzes information signals from input devices to determine machine elevation control.

(D.I. 1-6 at 237.)

190. The sensors are continuously detectable by the ECM. For example, a video walkaround of the PM 620 by A.J. Lee, Market Segment Manager – Cold Planers, Caterpillar, explains that "with that hydraulic system, we get that possible by "smart cylinders"—in position sensing cylinders. On this machine, just about every hydraulic cylinder is a position-sensing cylinder that knows what that cylinder is doing at all times." https://www.youtube.com/watch?v=sQWDXdaXPB8.

191. The ECM regulates the lifting positions of the lifting columns in response to the path signals detected by the sensors.

The Cold Planer has four hydraulically adjustable legs, one on each corner of the machine. These legs control the height and angle of the machine. The leg heights can be manually adjusted by the operator or automatically adjusted by the grade & slope system.

(D.I. 1-6 at 513.)

> The system is now in Automatic mode and will drive the machine's hydraulics to maintain the intended Target values.

(D.I. 1-6 at 776, Caterpillar Publication M0068306-01, Systems Operation Testing and Adjusting Troubleshooting, PM620 and PM622 Cold Planer Monitoring System/Grade and Slope (March 2016).) This is accomplished through signaling by the ECM, which adjusts height via the hydraulic system.

> Leg position sensors (9), (10), (11), and (12) allow machine ECM (2) to monitor the vertical position of the machine to control the rotor cut depth. Five preset leg positions are associated with the leg elevation system as follows:
>
> - In the fully retracted condition, the cylinder extension is 0.0 mm (0.0 inch) and the PWM signal from the sensor is 10.0 percent.
> - In the SCRATCH position, the cylinder extension is 369.0 mm (14.5 inch) and the PWM signal from the sensor is 51.6 percent.
> - In the PRE-SCRATCH position, the cylinder extension is 419.0 mm (16.5 inch) and the PWM signal from the sensor is 57.2 percent.
> - In the PRE-SERVICE position, the cylinder extension is 658.0 mm (25.9 inch) and the PWM signal from the sensor is 84.1 percent.
> - In the SERVICE HEIGHT (fully extended) position, the cylinder extension is 708.0 mm (27.9 inch) and the PWM signal from the sensor is 89.8 percent.

(D.I. 1-6 at 238.)

> Machine ECM (2) generates output signals (8) to control the machine elevation. When leg adjustments are made, the following components receive direct output signals from the machine ECM:
>
> - Rear leg speed solenoid (18)
> - Rear leg lower solenoid (19)
> - Rear leg raise solenoid (20)
> - Right front leg lower solenoid (21)
> - Right front leg raise solenoid (22)
> - Left front leg lower solenoid (23)
> - Left front leg raise solenoid (24)

(D.I. 1-6 at 238.)

> To maintain the overall machine pitch and slope during an all-legs adjustment, the elevation system enters into a closed-loop control function. In this case, all leg position sensors (9), (10), (11), and (12) are used to manage relative cylinder positions.

(D.I. 1-6 at 239.)

192. Even in manual mode, the ECM utilizes the path signals detected by the sensors to regulate the lifting positions of the lifting columns.

> When the front leg height is adjusted, leg position sensors (9) and (10) are used to determine cylinder position. Machine ECM (2) monitors the position to control elevation rate or limits as follows:

(D.I. 1-6 at 238.)

> When the rear leg height is adjusted, leg position sensors (11) and (12) are used to determine cylinder position. Since the rear legs travel together, the average position of the cylinders is used for travel limit locations. Machine ECM (2) monitors the position to control elevation rate or limits as follows:

(D.I. 1-6 at 239.) When the system receives an all-legs adjustment command:

To maintain the overall machine pitch and slope during an all-legs adjustment, the elevation system enters into a closed-loop control function. In this case, all leg position sensors (9), (10), (11), and (12) are used to manage relative cylinder positions.

Machine ECM (2) determines all the cylinder positions when a command is generated. During a command, the ECM maintains equal velocity and relative position for each leg to keep the machine pitch and slope stable. The relative position of the cylinders is kept within ±15 mm (0.60 inch) from side to side (slope). The fore to aft (pitch) relative position is kept within ±30 mm (1.20 inch).

(D.I. 1-6 at 239.)

193. The Operation and Maintenance Manual describes the "All Legs Raise" control mode.

All Legs Raise (25)

All Legs Raise – When the button is pressed and held, all leg heights are first equalized then all four legs extend at the same rate. When raising, the legs will automatically stop extending at the pre-service height. Hold the button for 3 seconds in order to continue to raise the machine. Both the raise and lower indicators will illuminate when the legs have reached the service height.

(D.I. 1-6 at 50.) It also describes an "All Legs Lower" control mode.

All Legs Lower (32)

All Legs Lower – When the button is pressed, all leg heights are first equalized then all four legs retract at the same rate. When lowering, the legs will automatically stop retracting just before the side plates (in the lowered position) come in contact with the surface. Release the button, and press the button again in order to continue to lower the machine. Both the raise and lower indicators will illuminate when the legs have reached the service height.

(D.I. 1-6 at 50.) Both control modes are examples of the regulation of the lifting positions of the lifting columns in response to path signals detected by the lifting position measuring devices.

194. Accordingly, all the limitations of claim 1 of the '592 patent are met by the Large Infringing Products manufactured at least before about October 2020.

195. Claim 5 is an exemplary dependent claim:

> The road construction machine of claim 1, wherein:
> the controller is operable to define a reference plane relative to the ground surface or traffic surface, and the controller is operable to store measured signals from the lifting position measuring devices corresponding to current lifting positions of the lifting columns and to thereby define a current spatial position of the machine frame relative to the reference plane as a reference spatial position of the machine frame.

196. As discussed above, during an all-legs adjustment, "the ECM maintains equal velocity and relative position for each leg to keep the machine pitch and slope stable." (D.I. 1-6 at 239.) Furthermore, in a video of a working demonstration of the PM 620, Caterpillar discusses a feature called "obstacle jumping." The video describes obstacle jumping as follows: "If there is an obstacle, using this automation system they can actually go up to that obstacle, come up out of the cut or up out of that previous grade, tram over that obstacle, and then return to[sic] that machine

to the previous cutting depth in auto helping to simplify the currently manual task." https://www.youtube.com/watch?v=2xLMaIxZyLs. On information and belief, a controller defines a reference plane relative to the ground surface by storing measured signals from the lifting position measuring devices. On further information and belief, the controller uses current lifting positions from one or more lifting positions measuring devices to adjust the extension of one or more lifting columns while jumping the obstacle, thereby defining a spatial position while out of the cut relative to the reference spatial position.

197. Accordingly, all the limitations of claim 5 of the '592 patent are met by the Large Infringing Products manufactured at least before about October 2020.

198. Claim 15 is also exemplary:

> The road construction machine of claim 1, wherein:
> the controller is operable to regulate a working depth of the working drum at least in part in response to the path signals measured by the measuring devices.

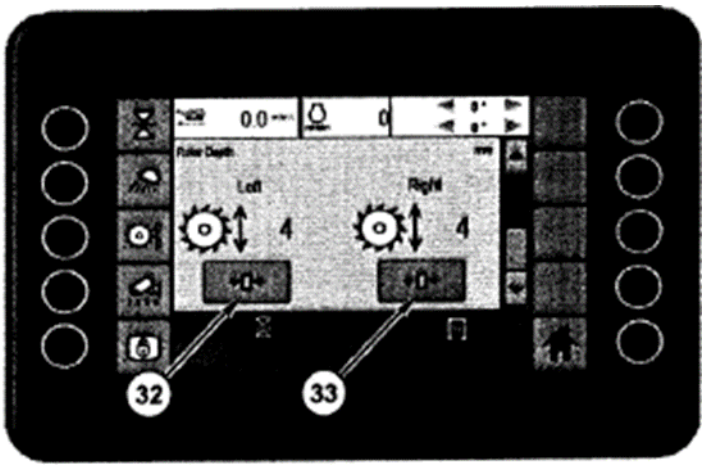
199. The rotor cut depth ("working depth of the working drum") is controlled based on the monitored vertical position of the machine, which is itself based at least in part on the signals produced by the leg position sensors.

> Leg position sensor (15) is a linear sensor that sends a pulse-width modulated (PWM) signal directly to the machine ECM. These sensors allow the ECM to monitor the vertical position of the machine to control the rotor cut depth.

(D.I. 1-6 at 224.)

> Leg position sensors (9), (10), (11), and (12) allow machine ECM (2) to monitor the vertical position of the machine to control the rotor cut depth. Five preset

(D.I. 1-6 at 238.) The display for the Caterpillar Products includes a "Rotor Depth Page" wherein the operator can input an intended Rotor Depth Set button for the left side (32) and for the right side (33).



(D.I. 1-6 at 818-19.) As the drum is fixed to the machine frame, the "working depth of the working drum" corresponds to the lifting positions of the lifting columns, wherein the controller can regulate the working depth of the drum based on the set point provided by the operator and at least in part in response to the signals produced by the lifting position sensors.

200. Accordingly, all the claim limitations of claim 15 of the '592 patent are met by the Large Infringing Products manufactured at least before about October 2020.

201. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the '592 patent.

202. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

203. Caterpillar Paving Products Inc. cited U.S. Patent. App. No. 2010/0109422, which issued as the '592 patent, during prosecution of U.S. Patent Nos. 8,757,729 (issued June 24, 2014), 8,874,325 (issued October 28, 2014), 8,973,688 (issued March 10, 2015), and 10,266,996 (filed August 30, 2017), all of which are assigned to Caterpillar Paving Products Inc.

204. Caterpillar was also made aware of the '592 patent and its infringement thereof at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

205. Caterpillar has made profits from their acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

206. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

207. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 5: INFRINGEMENT OF U.S. PATENT NO. 9,010,871
(PATH MEASUREMENT 2)

208. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

209. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the '871 patent by importing, making, distributing, using, offering to sell, or selling one or more of the Large Infringing Products.

210. Caterpillar has engaged in activities which constitute direct infringement of at least claims 1, 2, 5-15, 18-34 of the '871 patent, in violation of U.S.C. § 271(a).

211. Upon information and belief, Caterpillar's customers that have purchased the Large Infringing Products manufactured at least before about October 2020 have and continue to engage in activities which constitute direct infringement of at least claims 23-34 of the '871 patent, in violation of 35 U.S.C. § 271(a).

212. Caterpillar has and is inducing infringement of the '871 patent by actively and knowingly inducing purchasers of the Large Infringing Products manufactured at least before about October 2020 to use them in a way that infringes at least claims 23-34 of the '871 patent, in

violation of 35 U.S.C. § 271(b). Operation of the Large Infringing Products manufactured at least before about October 2020 practices at least claims 23-25 and 34.

213. Claim 1 of the ’871 patent is exemplary:

> A road construction machine, comprising: a machine frame;
> a working drum supported from the machine frame for working a ground surface or traffic surface;
> a plurality of ground engaging supports for supporting the construction machine on the ground surface or traffic surface;
> a plurality of lifting columns, each one of the lifting columns being connected between the machine frame and one of the ground engaging supports, each one of the lifting columns including two telescoping hollow column members and at least one piston-cylinder unit located within the telescoping hollow column members for adjusting a height of the lifting column so that each one of the lifting columns is individually adjustable in height relative to the machine frame, each lifting column having a lifting position corresponding to a position of one of the two telescoping hollow column members relative to the other of the two telescoping hollow column members;
> a plurality of lifting position measuring devices, each lifting position measuring device being coupled with elements of one of the lifting columns, which elements are capable of being displaced relative to one another in accordance with the lifting position of the lifting column in such a manner that a path signal pertaining to the lifting position of the lifting column is continuously detectable by the measuring device.

214. For the reasons discussed above in relation to claim 1 of the ’592 patent, all the limitations of claim 1 of the ’871 patent are met by the Large Infringing Products manufactured at least before about October 2020.

215. Claim 23 of the ’871 patent is also exemplary:

> A method of operating a road construction machine, the machine including a machine frame, a working drum supported from the machine frame, a plurality of ground engaging supports, and a plurality of lifting columns connected between the machine frame and the ground engaging supports, the method comprising:
> detecting a lifting position of each of the lifting columns and continuously generating a path signal for each lifting column corresponding to the lifting positions of each lifting column.

216. Exemplary dependent claims include claims 24 and 25.

217. Claim 24 recites:

> The method of claim 23, further comprising:
> receiving the path signals in a controller; and regulating the lifting positions of the lifting columns with the controller in response to the path signals received by the controller.

218. Claim 25 recites:

> The method of claim 24, further comprising:
> defining a reference plane with the controller relative to a ground surface, and storing path signals received by the controller and thereby defining a current spatial position of the machine frame relative to the reference plane as a reference spatial position of the machine frame.

219. Claim 34 recites:

> The method of claim 24, wherein:
> the regulating step further comprises regulating a working depth of the working drum at least in part in response to the path signals received by the controller.

220. For the reasons discussed above in relation to claims 1, 5, and 15 of the '592 patent, all the limitations of claim 23-34 of the '871 patent are met by operation of the Large Infringing Products manufactured at least before about October 2020.

221. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the '871 patent.

222. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

223. Caterpillar Paving Products Inc. cited U.S. Patent. App. No. 2012/0179339, which issued as the '871 patent, during prosecution of U.S. Patent Nos. 8,807,868 (issued August 19, 2014), and 8,888,194 (issued November 18, 2014), all of which were assigned to Caterpillar Paving Products Inc. at the time they issued.

224. Caterpillar was also made aware of the '871 patent and its infringement thereof

at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

225. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

226. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

227. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 6: INFRINGEMENT OF U.S. PATENT NO. 9,656,530
(PATH MEASUREMENT 3)

228. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

229. Caterpillar has and continues directly or indirectly, and willfully, infringe one or more claims of the '530 patent by importing, making, distributing, using, offering to sell, or selling one or more of the Large Infringing Products manufactured at least before about October 2020.

230. Caterpillar has engaged in activities which constitute direct infringement of at least claims 1-20, 23-26, and 28 of the '530 patent, in violation of U.S.C. § 271(a).

231. Claim 1 of the '530 patent is exemplary:

> A road construction machine, comprising: a machine frame;
> a working drum supported from the machine frame for working a ground surface or traffic surface;
> a plurality of ground engaging supports for supporting the construction machine on the ground surface or traffic surface;
> a plurality of lifting columns, each one of the lifting columns being connected between the machine frame and one of the ground engaging supports, each one of the lifting columns including two telescoping hollow column members and at

> least one piston-cylinder unit located within the telescoping hollow column members for adjusting a height of the lifting column so that each one of the lifting columns is adjustable in height relative to the machine frame, each lifting column having a lifting position corresponding to a position of one of the two telescoping hollow column members relative to the other of the two telescoping hollow column members; and
>
> a plurality of lifting position sensors, each lifting position sensor being coupled with elements of one of the lifting columns, which elements are capable of being displaced relative to one another in accordance with the lifting position of the lifting column in such a manner that a signal including information on a current lifting position of a column is produced by the lifting position sensor, wherein each of the lifting position sensors is connected to the at least one piston cylinder unit located within its associated lifting column.

232. For the reasons discussed above in relation to the claims of the '592 patent, all the limitations of claim 1 of the '530 patent are met by the Large Infringing Products manufactured at least before about October 2020.

233. Caterpillar has or has been, at all times relevant to this action, fully aware of and have or had actual knowledge of the '530 patent.

234. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

235. An International Search Report that issued regarding International App. No. PCT/US2019/057451 to applicant Caterpillar Paving Products cited the '530 patent.

236. Caterpillar was also made aware of the '530 patent and its infringement thereof at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

237. On October 1, 2018, the administrative law judge issued an FID concluding that Caterpillar's Large Infringing Products infringe valid claims 2, 5, 16, and 23 of the '530 patent. That decision was affirmed by both the ITC and the Federal Circuit.

238. At least claims 2, 5, 16, and 23 of the '530 patent have been held valid in IPR challenges before the PTAB. That decision was affirmed without opinion by the Federal Circuit.

239. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

240. Any continued assertions by Caterpillar that claims 2, 5, 16, and 23 of the '641 patent are invalid or that the Large Infringing Products do not infringe claims 2, 5, 16, and 23 of the '641 patent would render this case exceptional under 35 U.S.C. § 285 and would constitute unreasonable and vexatious multiplication of the proceedings under 28 U.S.C. § 1927.

241. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

242. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 7: INFRINGEMENT OF U.S. PATENT NO. 7,946,788
(SENSOR SWITCHING 1)

243. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

244. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the '788 patent by importing, making, distributing, using, offering to sell, or selling one or more of the Large Infringing Products.

245. Caterpillar has engaged in activities which constitute direct infringement of at least claims 1, 3, 5-8, and 10-14 of the '788 patent, in violation of U.S.C. § 271(a).

246. Upon information and belief, Caterpillar's customers that have purchased the Large Infringing Products have and continue to engage in activities which constitute direct infringement of at least claims 15, 17, and 19 of the '788 patent, in violation of 35 U.S.C. § 271(a).

247. Caterpillar has and is inducing infringement of the '788 patent by actively and knowingly inducing purchasers of Large Infringing Products to use Large Infringing Products in a way that infringes at least claims 15, 17, and 19 of the '788 patent, in violation of 35 U.S.C. § 271(b). Use of the "hot swapping" function described below practices at least claims 1, 3, 5-8, and 10-14 of the '788 patent.

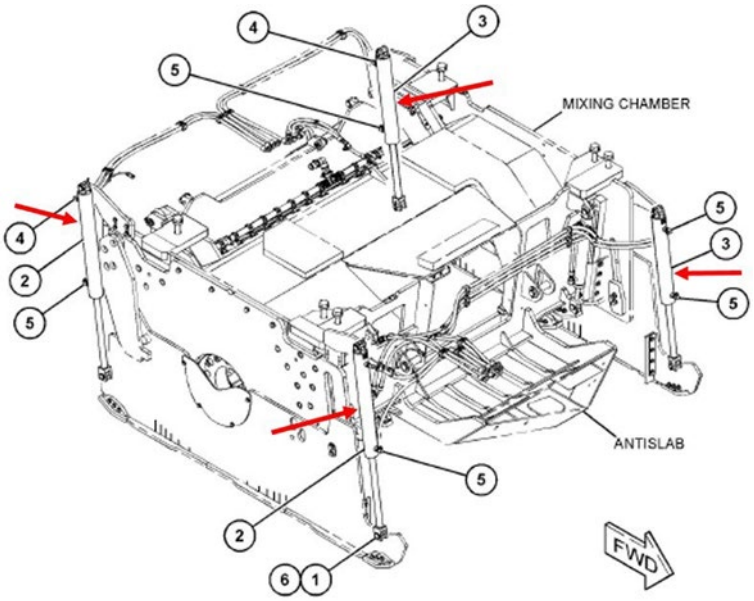
248. Claim 1 of the '788 patent is exemplary:

> A road construction machine for the treatment of road surfaces, comprising:
> a milling drum, the milling drum being position adjustable with regard to milling depth and/or slope; and
> a leveling system operable to control the milling depth and/or slope, the leveling system including:
> a plurality of selectable sensors for sensing current actual values of operating parameters including the milling depth and/or the slope of the milling drum relative to a reference surface;
> a plurality of indication and setting devices, each of the indication and setting devices being associatable with at least one of the plurality of selectable sensors, each indication and setting device being operable to indicate the current actual value of and to set a set value for the operating parameter sensed by its associated sensor;
> a controller operable to control the milling depth and/or the slope of the milling drum conditioned on set values and sensed current actual values of the operating parameters sensed by a selected subset of the plurality of selectable sensors by returning at least one adjustment value to adjust the milling depth and/or the slope of the milling drum so that the sensed current actual values of the operating parameters approach the set values for the selected subset of the plurality of selectable sensors;
> a switchover device operable to switch over from control based upon a first selected subset ofthe plurality of selectable sensors to control based upon a second selected subset, the second selected subset exchanging at least one replacement sensor not in the first subset for at least one replaced sensor that was in the first subset; and
> the controller being operable to effect switchover from control based upon the first selected subset of selectable sensors during milling operation without interruption of the milling operation and without any erratic alteration of the at least one adjustment value for adjusting the milling depth and/or slope of the milling drum.

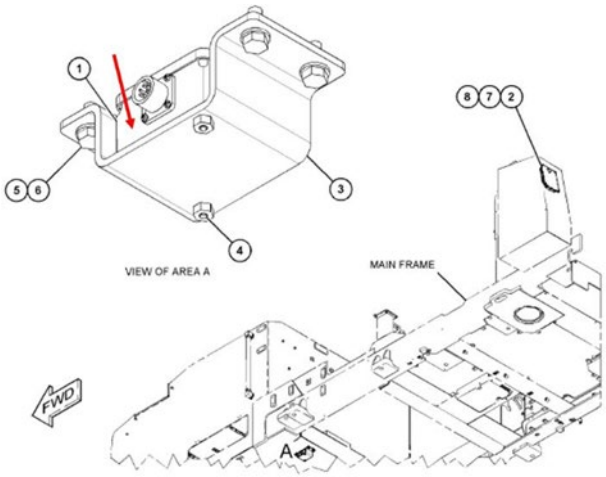
249. As discussed above, Large Infringing Products include milling machines with a height- adjustable milling drum allowing for adjustment of milling depth and, by way of

independent adjustment of the legs, slope of the drum.

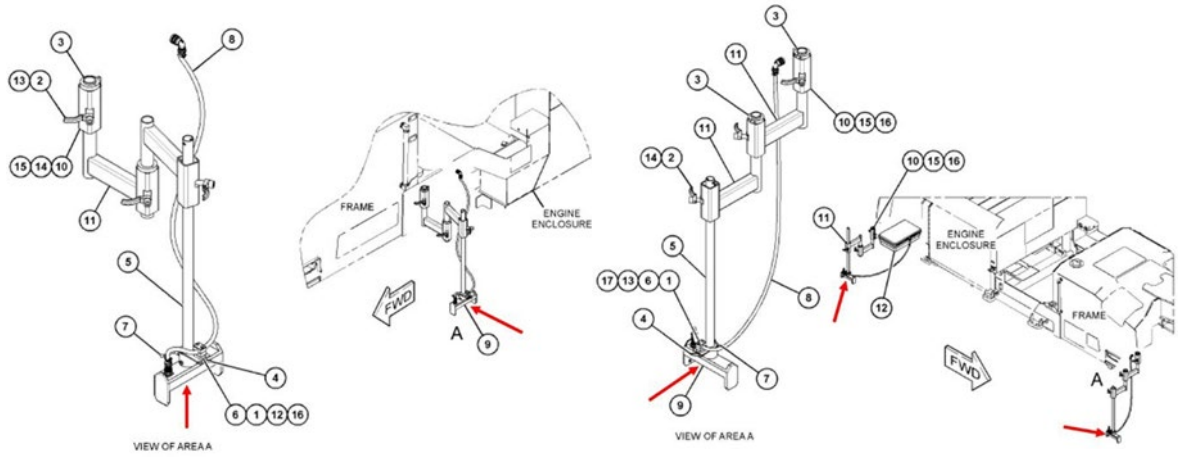
250. Large Infringing Products possess a leveling system configured to control milling depth and the slope of the drum. Large Infringing Products have numerous sensors configured to sense the milling depth of the drum or the slope of the drum. Each side plate (encloses the area to the sides of the milling drum) is height-adjustable via hydraulic cylinders equipped with smart sensors. Exhibit 21 indicates that these hydraulic cylinders (red arrows and designated "2" for right side or "3" for left side) contain a linear position sensor (part # 419-3871).



(D.I. 1-4 at 15.) Exhibit 21 further indicates that Infringing Products are equipped with an inertial sensor (red arrow and designated "1"; part # 433-6936) mounted below the frame and in front of the milling drum, which would allow for measurement of the milling drum's slope.



(D.I. 1-3 at 48.) Exhibit 21 additionally indicates that optional sonic sensors (red arrows and designated "9"; part # 372-0971) may be mounted to the infringing products for "grade control."



(D.I. 1-3 at 102, 104.)

251. Large Infringing Products possess a plurality of indication and setting devices, each of which can be associated with at least one of the sensors to indicate the actual current value of and to set a value for milling depth or slope. Exhibit 20 discusses CAT Grade Control, a "[s]ystem [that] communicates directly with position-sensing hydraulic cylinders, slope sensors and processors to ensure optimal precision." (D.I. 1-1 at 250.) A photograph of an operating panel of Infringing Products is reproduced below. On the left side of the panel, an actual current value (the red 0.5%) and a set ("target") value (the larger black 0.8%) of a slope sensor (red square) can

be seen. On the right side of the panel, an actual current value (the green -121 mm) and a target value (the black -120 mm) of right side plate (blue square) can be seen. (*See* D.I. 1-6 at 748.)

(D.I. 1-1 at 250.) Furthermore, the actual values for additional sensors are displayed in smaller text below the selected sensor information. The values that can be displayed include those for the cross-slope sensor, left and right sonic sensors, left and ride side plate sensors, left and right inboard sensors, left and right sonic string sensors, and averages of combinations thereof. (D.I. 1-6 at 754-755.) As seen above, the cross slope is displayed as 0.6%, and the depth of the left side plate is displayed as -42 mm. The buttons corresponding to the paired up and down arrows on the upper left and upper right sides allow the operator to adjust the target value for the selected sensor. (D.I. 1-6 at 746-47.) Thus, the left side and right side each constitute an indication and setting device.

252. Adjustment of the target value causes the milling depth or slope to increase or decrease accordingly. This operation causes the sensed current actual value of the milling depth or slope to approach the target value. As seen above, the operator has set the value of the right side plate to -120 mm. As a result, the right side plate has changed height to -121 mm, which approaches the set value of -120 mm. Thus, operator input into the indication and setting device that changes the target value causes the controller and switchover system to adjust the milling depth or slope.

A Caterpillar marketing video discusses the "grade and slope control system" that "allows operators to easily set up grade as well as quickly and accurately change cut depth and or percentage of slope during operation." https://www.youtube.com/watch?v=2xLMaIxZyLs.

253. The controller and switchover system also allows the operator to switch over from control based upon a first subset of sensors to control based on a second subset of sensors. (*See generally* D.I. 1-6 at 767-68.) In the photograph above, the first subset of sensors would be the slope sensor set to 0.8% and the right side plate sensor set to -120 mm. A second subset of sensors could be the left side plate sensor currently measuring -42 mm and the right side plate sensor set to -120 mm. The Caterpillar marketing video also discusses this feature: "This system also allows the operators to change between grade sensors, what we would call hot swapping. If the grade reference changes, the operator can swap between the side plate to the inboard ski or the sonic averaging system." https://www.youtube.com/watch?v=2xLMaIxZyLs.

254. Accordingly, all the limitations of claim 1 of the '788 patent are met by Large Infringing Products.

255. Claim 3 is an exemplary dependent claim:

> The road construction machine of claim 1, wherein: the controller is operable to set, no later than at the time of the switchover, a set value for an operating parameter for the replacement sensor to the current actual value for the operating parameter of the replacement sensor.

256. Claim 3 is directed to one of several preferred techniques for revising the values of the replacement sensor so as to avoid interruption of the milling operation on switchover. The technique of claim 3 sets the set value for the replacement sensor to the current actual value for the replacement sensor. On information and belief, Large Infringing Products utilize this technique.

257. Accordingly, all the limitations of claim 3 of the '788 patent are met by Large

Infringing Products.

258. Claim 15 of the '788 patent is also exemplary:

> A method of controlling the milling depth and/or the slope of a milling drum of a road construction machine, the method comprising:
> (a) setting a set value for an operational parameter of at least one sensor, the operational parameter being milling depth of the milling drum associated with the at least one sensor and/or slope of the drum;
> (b) conducting a milling operation;
> (c) during the milling operation, sensing a current actual value of the operational parameter of the at least one sensor relative to a reference surface;
> (d)generating an adjustment value with a controller, the adjustment value correlating to adifference between the set value and the current actual value of the operational parameter of the at least one sensor;
> (e) controlling the milling depth and/or the slope of the milling drum based on the adjustment value; and
> without interrupting the milling operation, switching over the control of the milling depth from control based at least in part on the at least one sensor to control based at least in part on a replacement sensor not included in the at least one sensor, without altering the adjustment value at the time of switching over.

259. Caterpillar's customers regularly use hot swapping during milling operations, for example when switching between automatic control based on grade (e.g., sonic sensor, side-plate sensor) and automatic control based on slope (i.e., slope sensor).

260. For example, Caterpillar's advertising touts the hot swapping feature:

- "Sensor configurations are hot swappable, allowing changes to occur while under operation." (Ex. 43 at 15.)
- "Hot swapping capability allows operator to change references while milling." (Ex. 43 at 15.)
- "Seamlessly swap between multiple grade or slope sensors for uninterrupted accuracy and a smooth result for any project." (Ex. 44 at 7.)

261. For the same reasons discussed regarding claim 1, Caterpillar's customers' use of hot swapping during milling with Large Infringing Products meets all the limitations of claim

15 of the ’788 patent.

262. The software that Caterpillar provides as part of the grade and slope control system of the Large Infringing Products always uses hot swapping when switching sensor control during automatic milling operations.

263. Accordingly, Caterpillar’s provision of the grade and slope control system induces infringement of claim 15 by its Customers.

264. Caterpillar is or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the ’788 patent.

265. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

266. Caterpillar’s acts are or were deliberate and willful and will continue unless enjoined by this Court.

267. As a result of the deliberate and willful nature of Caterpillar’s acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys’ fees.

COUNT 8: INFRINGEMENT OF U.S. PATENT NO. 8,511,932
(SENSOR SWITCHING 2)

268. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

269. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the ’932 patent by importing, making, distributing, using, offering to sell, or selling one or more Large Infringing Products.

270. Caterpillar has engaged in activities which constitute direct infringement of at least claims 9-12, 14, and 17 of the ’932 patent, in violation of U.S.C. § 271(a).

271. Upon information and belief, Caterpillar's customers that have purchased Large Infringing Products have and continue to engage in activities which constitute direct infringement of at least claims 1, 2, and 6 of the '932 patent, in violation of 35 U.S.C. § 271(a).

272. Caterpillar has and is inducing infringement of the '932 patent by actively and knowingly inducing purchasers of Large Infringing Products to use Large Infringing Products in a way that infringes at least claims 1, 2, and 6 of the '932 patent, in violation of 35 U.S.C. § 271(b). Use of the "hot swapping" function described above practices at least claims 1, 2, and 6 of the '932 patent.

273. Claim 1 of the '932 patent is also exemplary:

> A method of controlling at least one position characteristic of a milling drum of a road construction machine, the at least one position characteristic being from the group consisting of the milling depth of the drum and the slope of the drum, the method comprising:
>
> (a) setting a set value for an operational parameter of at least one sensor, the operational parameter being the operational parameter corresponding to at least one of the milling depth of the drum and the slope of the drum;
>
> (b) conducting a milling operation;
>
> (c) during the milling operation, sensing a current actual value of the operational parameter of the at least one sensor;
>
> (d) generating an adjustment value with a controller, the adjustment value correlating to a difference between the set value and the current actual value of the operational parameter of the at least one sensor;
>
> (e) controlling the at least one position characteristic based on the adjustment value;
>
> (f) without interrupting the milling operation, switching over the control of the at least one position characteristic from control based at least in part on the at least one sensor to control based at least in part on a replacement sensor not included in the at least one sensor; and
>
> (g) setting a value for the operational parameter of the replacement sensor to a current measured actual value of the operational parameter of the replacement sensor.

274. Claim 9 of the '932 patent is exemplary:

> A road construction machine for the treatment of road surfaces, comprising:
>
> a milling drum, the milling drum being position adjustable with regard to at

least one position characteristic selected from the group consisting of milling depth of the drum and slope of the drum; and

a leveling system configured to control the at least one position characteristic, the leveling system including:

a plurality of selectable sensors, each sensor configured to sense a current actual value of an operating parameter corresponding to at least one of the milling depth of the drum and the slope of the drum;

a plurality of indication and setting devices, each of the indication and setting devices being associatable with at least one of the plurality of selectable sensors, each indication and setting device being operable to indicate the current actual value of and to set a set value for each operating parameter sensed by its associated sensor or sensors;

a controller and switchover system configured to control the at least one position characteristic conditioned on set values or values and sensed current actual value or values of the operating parameter or parameters sensed by a selected subset of the plurality of selectable sensors by returning at least one adjustment value to adjust the at least one position characteristic so that the sensed current actual value or values of the operating parameter or parameters approach the set value or values for the selected subset of the plurality of selectable sensors;

the controller and switchover system being configured to switch over from control based upon a first selected subset of the plurality of selectable sensors to control based upon a second selected subset during milling operation without interruption of the milling operation, the second selected subset exchanging at least one replacement sensor not in the first subset for at least one replaced sensor that was in the first subset; and

wherein the controller and switchover system is operable to set a set value for an operating parameter for the replacement sensor to the current actual value for the operating parameter of the replacement sensor.

275. For the same reasons discussed regarding the ’788 patent, Large Infringing Products or use thereof meets all the limitations of claims 1, 2, 6, 9-12, 14, and 17 of the ’932 patent.

276. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the ’932 patent.

277. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

278. The examiner cited the ’932 patent during prosecution of U.S. Patent No.

9,103,079 (issued August 11, 2015), which assigned to Caterpillar Paving Products when it issued.

279. Caterpillar was also made aware of the ’932 patent and its infringement thereof at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

280. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

281. Caterpillar’s acts are or were deliberate and willful and will continue unless enjoined by this Court.

282. As a result of the deliberate and willful nature of Caterpillar’s acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys’ fees.

COUNT 9: INFRINGEMENT OF U.S. PATENT NO. 8,690,474
(SENSOR SWITCHING 3)

283. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

284. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the ’474 patent by importing, making, distributing, using, offering to sell, or selling one or more Large Infringing Products.

285. Caterpillar has engaged in activities which constitute direct infringement of at least claims 19-21, 24, 26-28, and 31 of the ’474 patent, in violation of U.S.C. § 271(a).

286. Upon information and belief, Caterpillar’s customers that have purchased Large Infringing Products have and continue to engage in activities which constitute direct infringement of at least claims 1-3, 6-8, and 33 of the ’474 patent, in violation of 35 U.S.C. § 271(a).

287. Caterpillar has and is inducing infringement of the ’474 patent by actively and

knowingly inducing purchasers of Large Infringing Products to use Large Infringing Products in a way that infringes at least claims 1-3, 6-8, and 33 of the '474 patent, in violation of 35 U.S.C. § 271(b). Use of the "hot swapping" function described above practices at least claims 1-3, 6-8, and 33 of the '474 patent.

288. Claim 1 of the '474 patent is exemplary:

> A method of controlling at least one position characteristic of a milling drum of a road construction machine, the at least one position characteristic being from the group consisting of the milling depth of the drum and the slope of the drum, the method comprising:
>
> (a) setting a set value for an operational parameter of at least one sensor, the operational parameter corresponding to at least one of the milling depth of the drum and the slope of the drum;
>
> (b) conducting a milling operation;
>
> (c) during the milling operation, sensing a current actual value of the operational parameter of the at least one sensor;
>
> (d) generating an adjustment value with a controller, the adjustment value correlating to a difference between the set value and the current actual value of the operational parameter of the at least one sensor;
>
> (e) controlling the at least one position characteristic based on the adjustment value;
>
> (f) without interrupting the milling operation, switching over the control of the at least one position characteristic from control based at least in part on the at least one sensor to control based at least in part on a replacement sensor not included in the at least one sensor; and
>
> (g) changing at least one of a set value of an operational parameter of the replacement sensor and a current measured actual value of the operational parameter of the replacement sensor such that the adjustment value is unchanged at the time of switching over.

289. Claim 19 of the '474 patent is also exemplary:

> A road construction machine for the treatment of road surfaces, comprising:
>
> a milling drum, the milling drum being position adjustable with regard to at least one position characteristic selected from the group consisting of milling depth of the drum and slope of the drum; and
>
> a leveling system configured to control the at least one position characteristic, the leveling system including:
>
> a plurality of selectable sensors, each sensor configured to sense a current actual value of an operating parameter corresponding to at least one of the milling depth of the drum and the slope of the drum;
>
> a plurality of indication and setting devices, each of the indication and setting

devices being associable with at least one of the plurality of selectable sensors, each indication and setting device being operable to indicate the current actual value of and to set a set value for each operating parameter sensed by its associated sensor or sensors;

a controller and switchover system configured to control the at least one position characteristic conditioned on set value or values and sensed current actual value or values of the operating parameter or parameters sensed by a selected subset of the plurality of selectable sensors by returning at least one adjustment value to adjust the at least one position characteristic so that the sensed current actual value or values of the operating parameter or parameters approach the set value or values for the selected subset of the plurality of selectable sensors;

the controller and switchover system being configured to switch over from control based upon a first selected subset of the plurality of selectable sensors to control based upon a second selected subset during milling operation without interruption of the milling operation, the second selected subset exchanging at least one replacement sensor not in the first subset for at least one replaced sensor that was in the first subset; and

wherein the controller and switchover system is operable to change at least one of the set value of the operating parameter of the replacement sensor and the sensed current actual value of the operating parameter of the replacement sensor such that the adjustment value is unchanged at the time of switch over.

290. For the same reasons discussed regarding the claims of the ’788 patent, Large Infringing Products or use thereof meets all the limitations of claims 1 and 19 of the ’474 patent.

291. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the ’474 patent.

292. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

293. Caterpillar Paving Products Inc. cited the ’474 patent during prosecution of U.S. Patent No. 10,233,598 (filed August 16, 2016).

294. Caterpillar was also made aware of the ’474 patent and its infringement thereof at least as early as June 16, 2017, the date of the filing of the Complaint in this matter.

295. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

296. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

297. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 10: INFRINGEMENT OF U.S. PATENT NO. RE48,268
(VIBRATION MOUNTING)

298. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

299. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the '268 patent by importing, making, distributing, using, offering to sell, or selling one or more Large Infringing Products.

300. Caterpillar has engaged in activities which constitute direct infringement of at least claims 14, 18, 19, 25-35, and 38-45 of the '268 patent, in violation of U.S.C. § 271(a).

301. Upon information and belief, Caterpillar's customers that have purchased Large Infringing Products have and continue to engage in activities which constitute direct infringement of at least claims 1-3, 6-8, 10, and 22-24 of the '268 patent, in violation of 35 U.S.C. § 271(a).

302. Caterpillar has and is inducing infringement of the '268 patent by actively and knowingly inducing purchasers of Large Infringing Products to use Large Infringing Products in a way that infringes at least claims 1-3, 6-8, 10, and 22-24 of the '268 patent, in violation of 35 U.S.C. § 271(b). Operation of the Large Infringing Machines during milling practices at least claims 1-3, 6-8, 10, and 22-24 of the '268 patent.

303. Claim 14 of the '268 patent is exemplary:

A construction machine, comprising:
a machine frame carried by a chassis;
a working drum;
a drive train including at least the following elements:
a drive engine;
a traction drive assembly for mechanically driving the working drum, the traction drive assembly including a drive [~~element~~] *pulley*, [~~an output element~~] *a driven pulley*, and a [~~traction element~~] *drive belt connecting the pulleys*;
a clutch for switching [~~the~~] *a* torque between the drive engine and the working drum; and
a hydraulic pump drive; and
wherein the elements of the drive train are divided into at least a first subset and a second subset; and
wherein the drive train further includes an articulated coupling connecting the first subset to the second subset; and
wherein the first subset includes at least the drive engine; and
wherein the second subset includes [~~at least one element selected from the group consisting of~~]:
the hydraulic pump drive;
the clutch; and
the drive [~~element~~] *pulley* of the traction drive assembly; and
wherein the first subset is attached to the machine frame elastically with a lower spring stiffness so that transmission of vibrations to the machine frame is reduced, and the second subset is attached to the machine frame with a higher spring stiffness or in a rigid manner;
wherein the clutch is connected between the hydraulic pump drive and the drive pulley;
wherein the drive engine has an output axis aligned with an input axis of the hydraulic pump drive and with an input axis of the drive pulley prior to operation of the construction machine; and
wherein the articulated coupling accommodates a lack of alignment between the output axis of the drive engine and the input axes of the hydraulic pump drive and the drive pulley due to dynamic movement of the first subset relative to the second subset during operation of the construction machine.

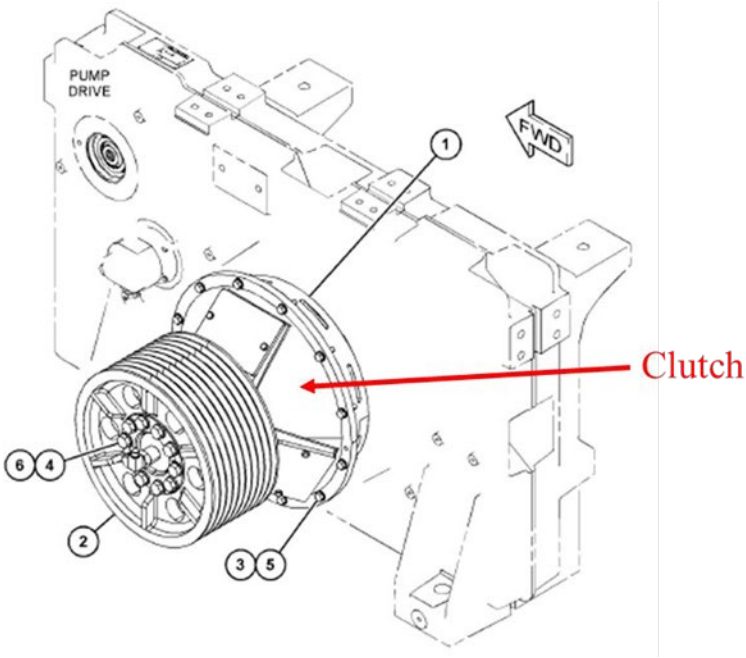
304. As discussed previously and shown below, Large Infringing Products are construction machines, with a machine frame carried by a chassis, a working drum, a drive train that includes a drive engine, and a traction drive assembly for mechanically driving the working drum that includes a drive pulley, a driven pulley, and a drive belt connecting the pulleys, and a clutch for switching torque between the drive engine and the working drum.

305. Large Infringing Products include a drive engine and a traction drive assembly

connecting the work motor to the working drum. The figure below depicts the drive engine for the working drum.

(D.I. 1-1 at 244.)

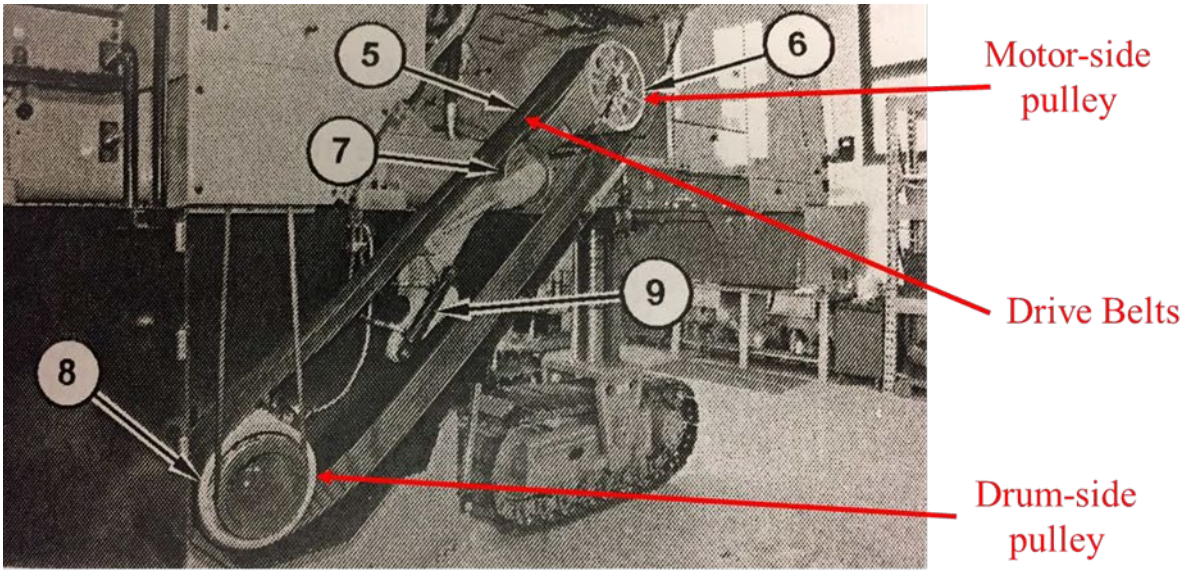
306. The drive engine is operatively coupled to a heavy-duty dry clutch (D.I. 1-1 at 248) that engages a drive belt, which in turn drives the working drum. As can be seen below, the clutch is connected between the hydraulic pump drive and the drive pulley.



(D.I. 1-3 at 179.)

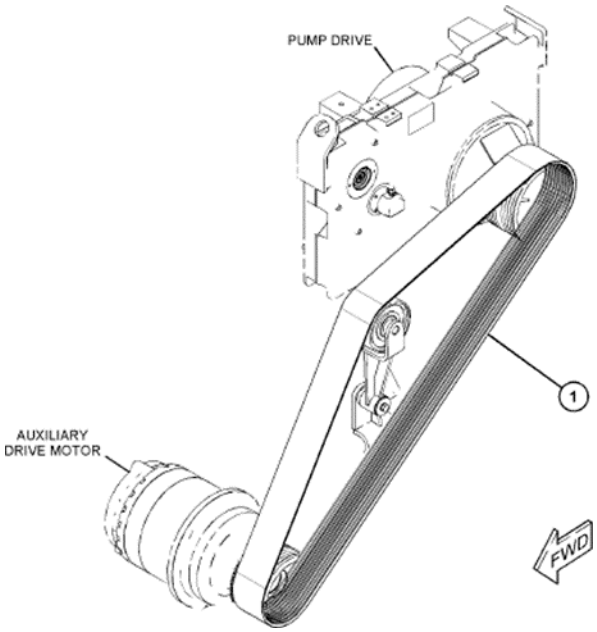
307. The belt drive includes a motor-side or drive pulley ("upper sheave"; designated

"6"), a drum-side or driven pulley ("lower sheave"; designated "8"), and multiple drive belts connecting the drive pulley to the driven pulley (designated "5").



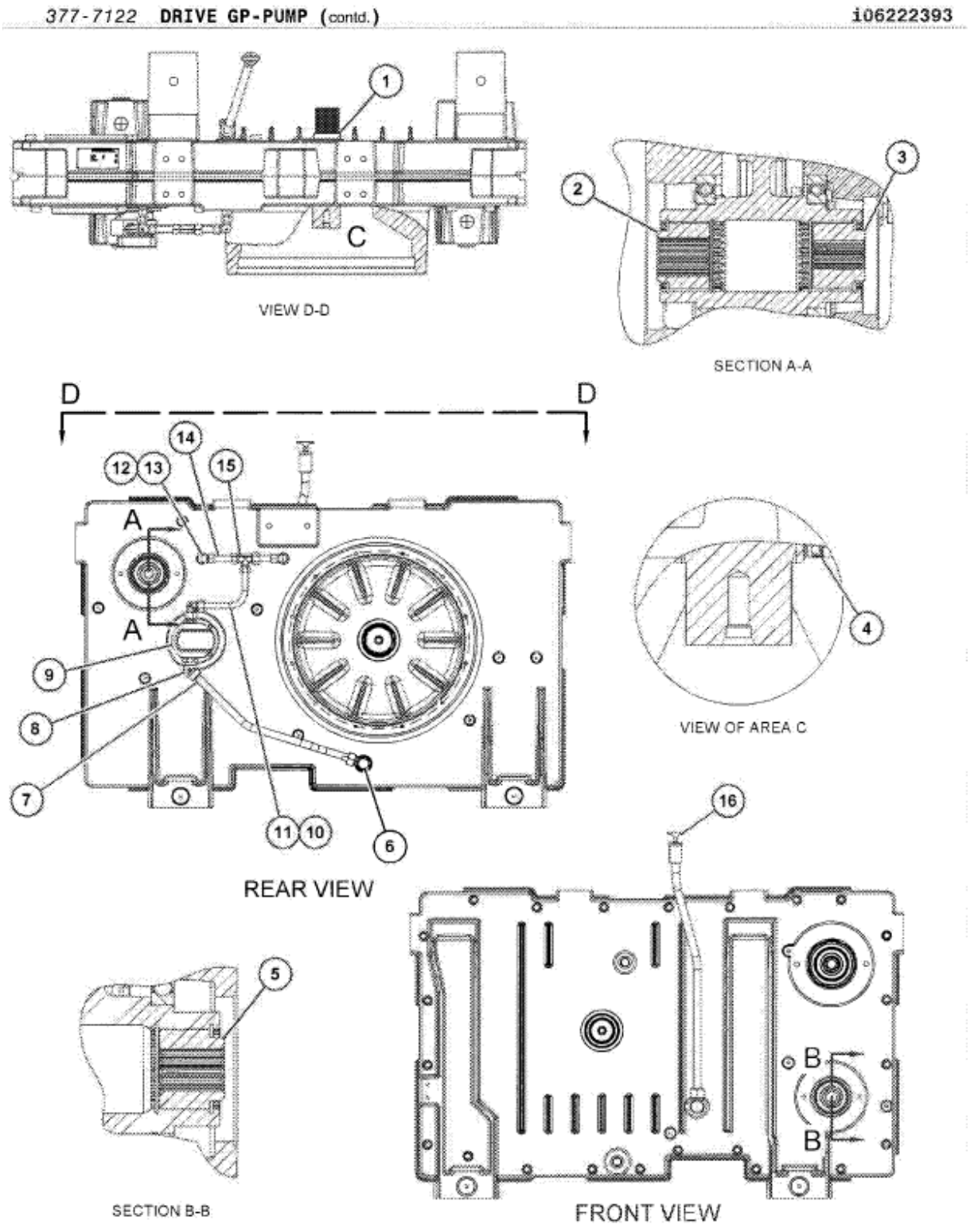
(D.I. 1-6 at 276.)

308. Large Infringing Products also include a hydraulic pump drive.



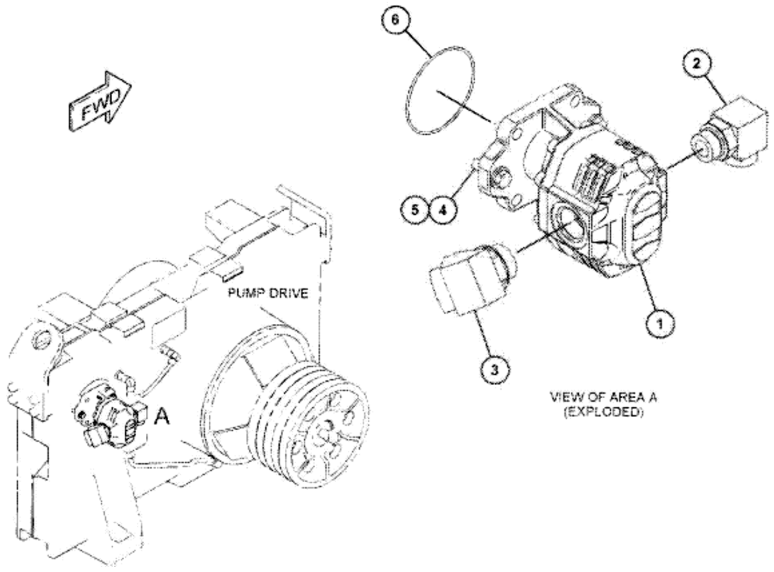
(D.I. 1-3 at 176.) Several views of the pump drive can be seen below. In the rear view, cross-section A-A indicates one coupling for a pump. In the front view, cross-section B-B shows

another coupling for a second pump.

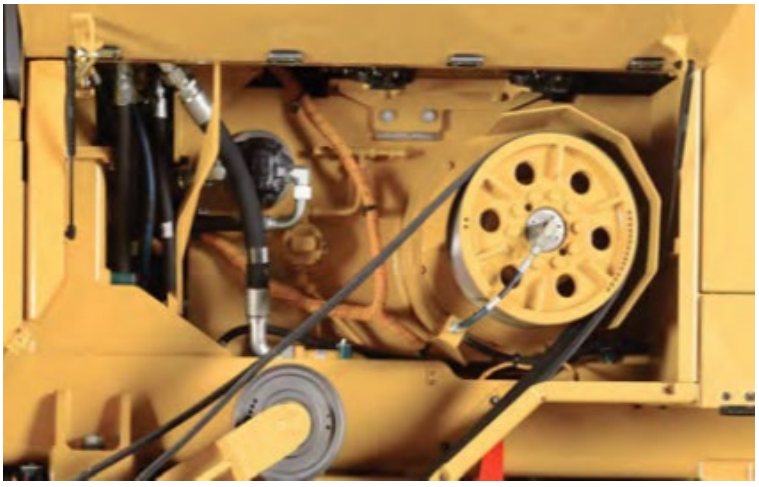


(D.I. 1-4 at 36.) Shown below is a schematic and photo showing the pump drive with a pump

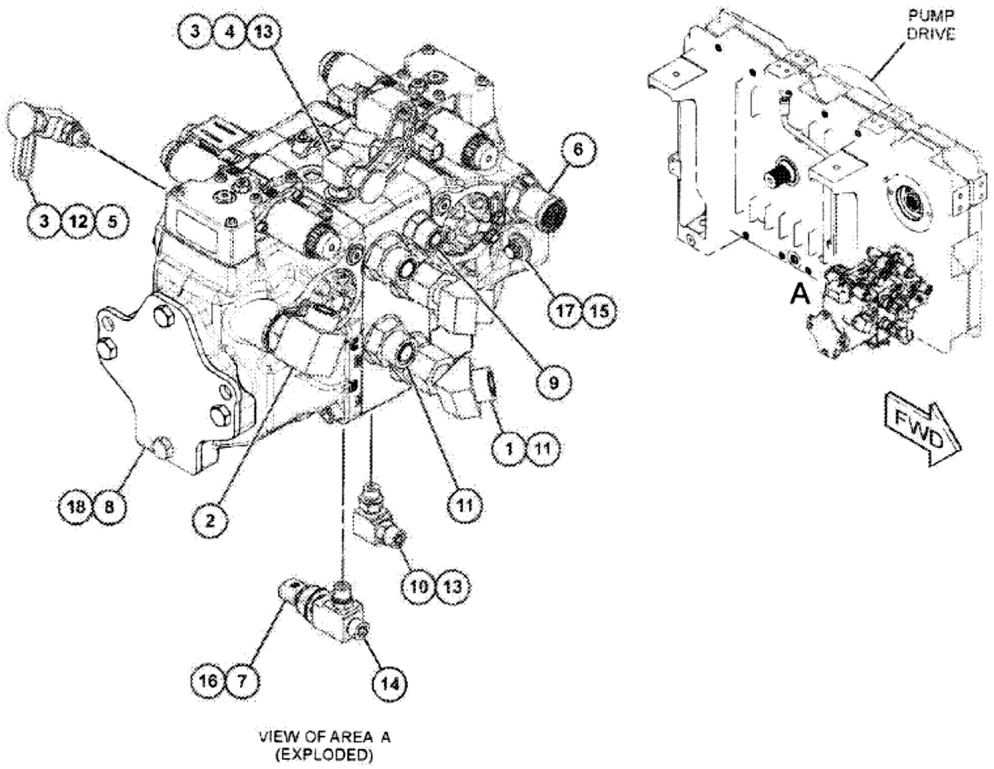
connected to the area designated A-A above.



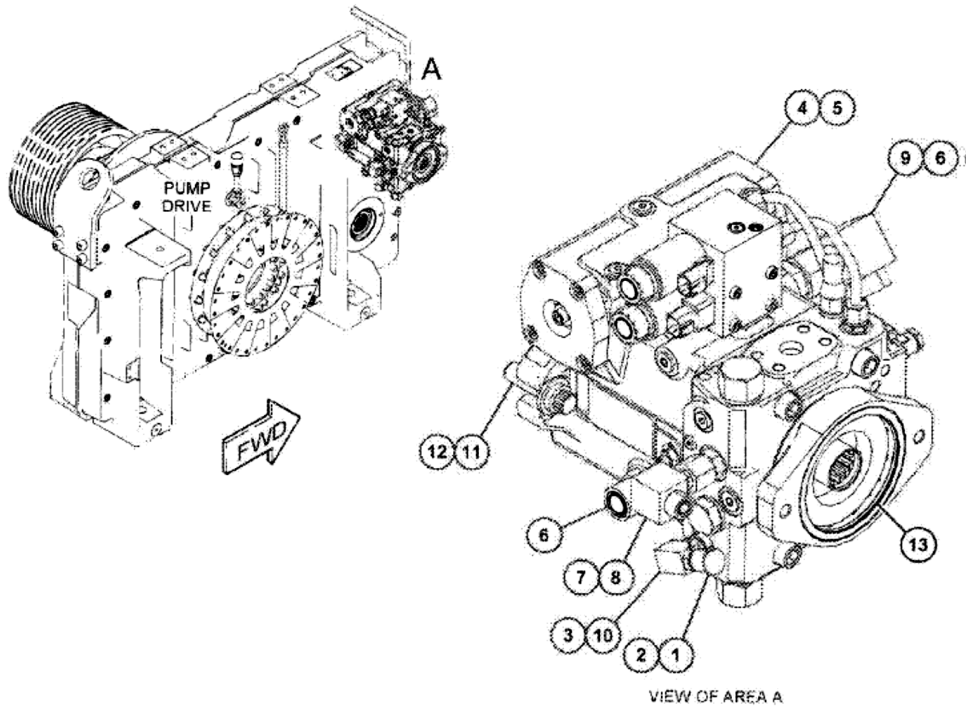
(D.I. 1-4 at 93.)



Shown below is a schematic showing the pump drive with a pump connected to the area designated B-B above.

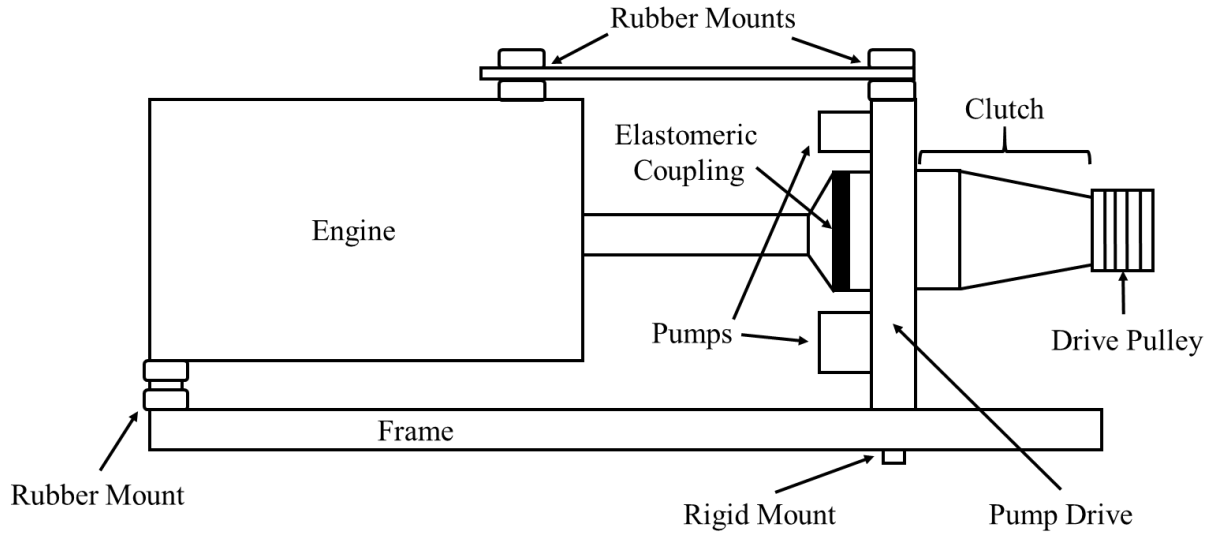


(D.I. 1-4 at 95.) Shown below is yet another schematic showing the pump drive with a third pump connected.

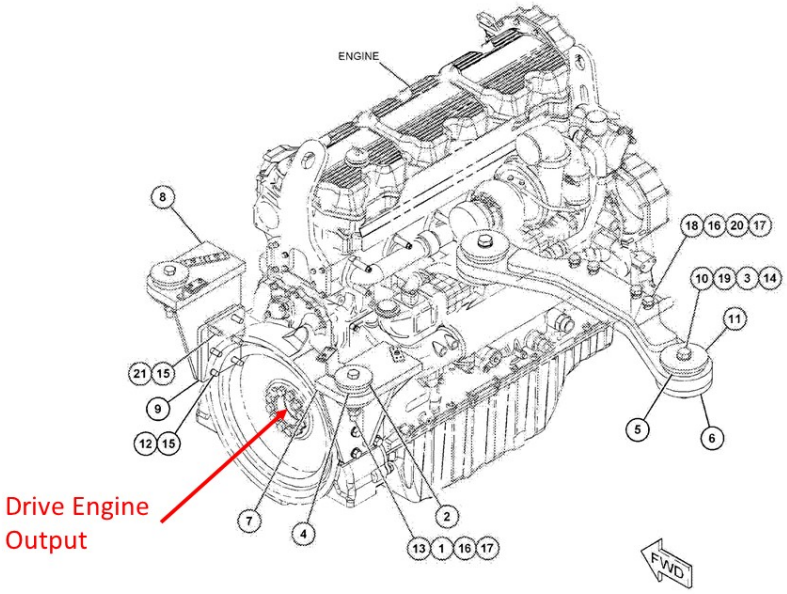


(D.I. 1-4 at 97.)

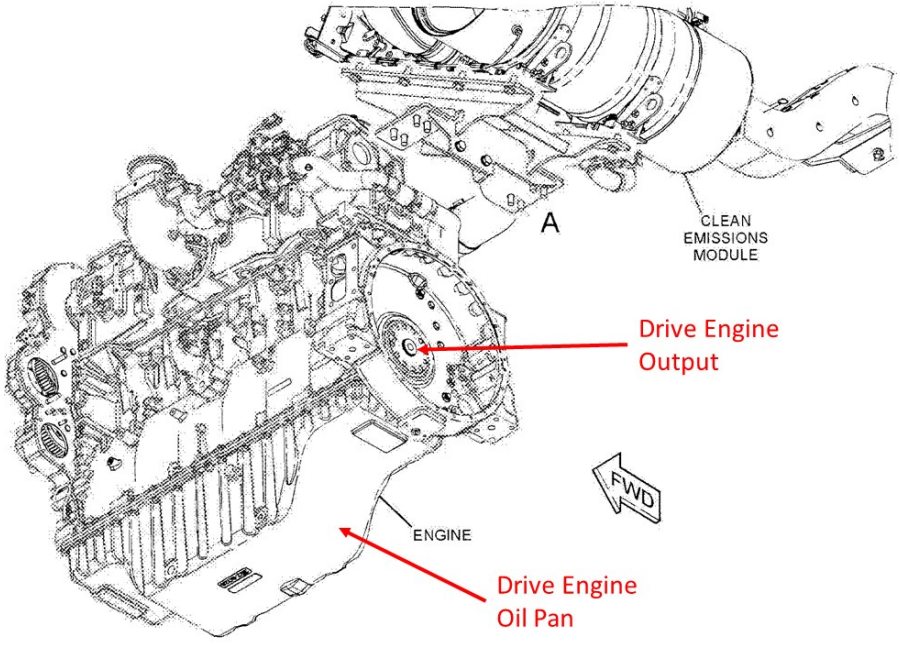
309. The elements of the drive train are divided into at least a first subset and second subset. The following is a schematic front view of the drive train arrangement of Large Infringing Products. As can be seen, the first subset includes at least the drive engine, and the second subset includes the hydraulic pump drive, the clutch, and the drive pulley of the traction drive assembly.



The drive engine has an output axis aligned with an input axis of the hydraulic pump drive and with an input axis of the drive pulley. The drawings below show the drive engine output, the hydraulic pump drive input, and the drive pulley input.

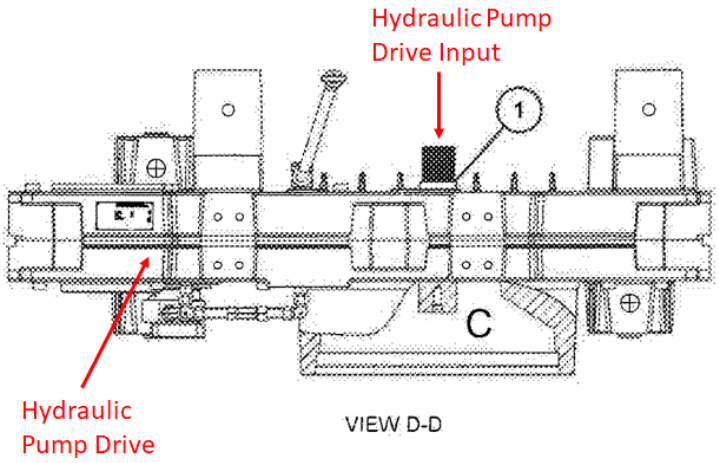


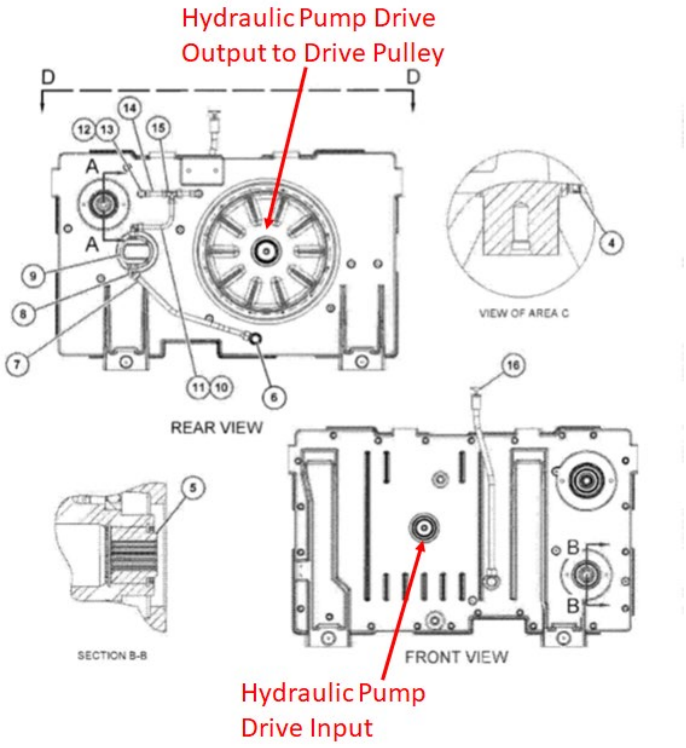
(D.I. 1-2 at 90).



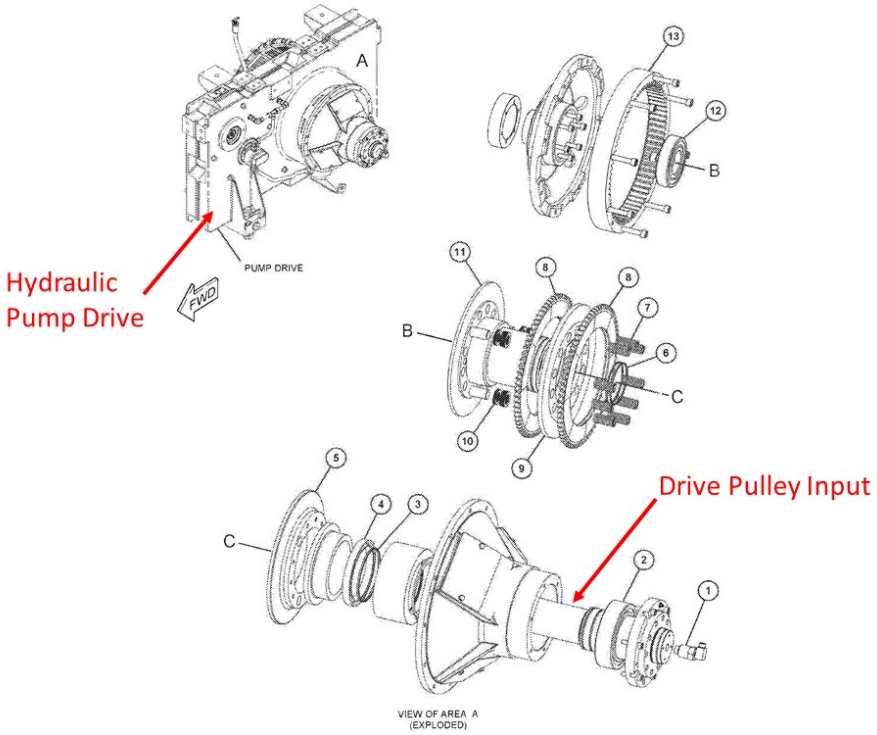
z

(D.I. 1-2 at 216).


Hydraulic Pump
Drive Input
1
C
Hydraulic
Pump Drive
VIEW D-D

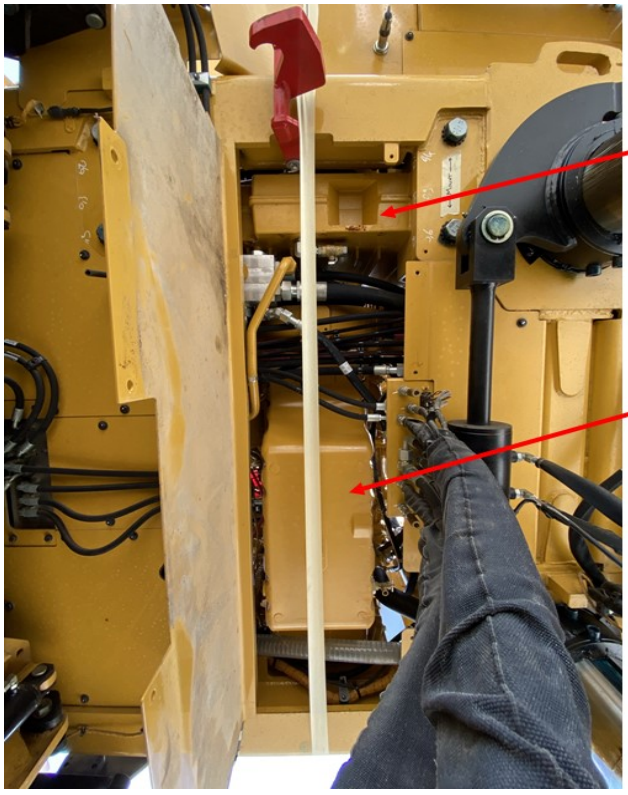

Hydraulic Pump Drive
Output to Drive Pulley
D
D
A
A
VIEW OF AREA C
REAR VIEW
SECTION B-B
B
B
FRONT VIEW
Hydraulic Pump
Drive Input

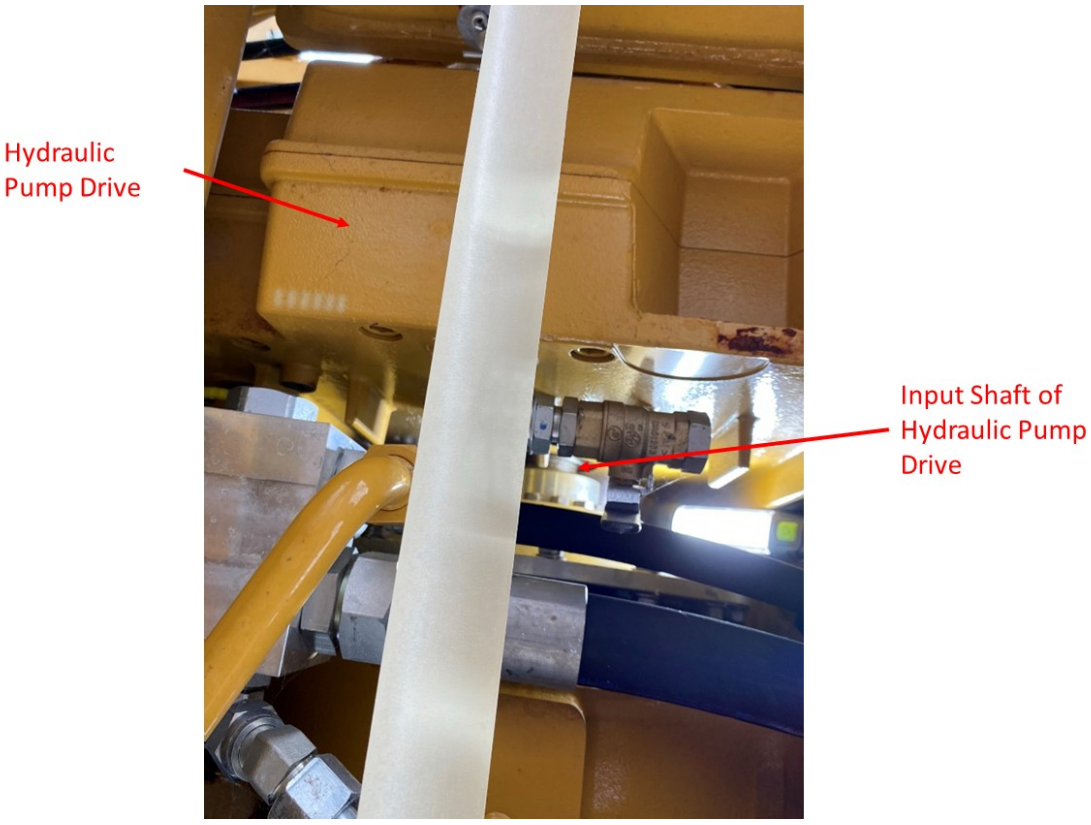
(D.I. 1-4 at 36).

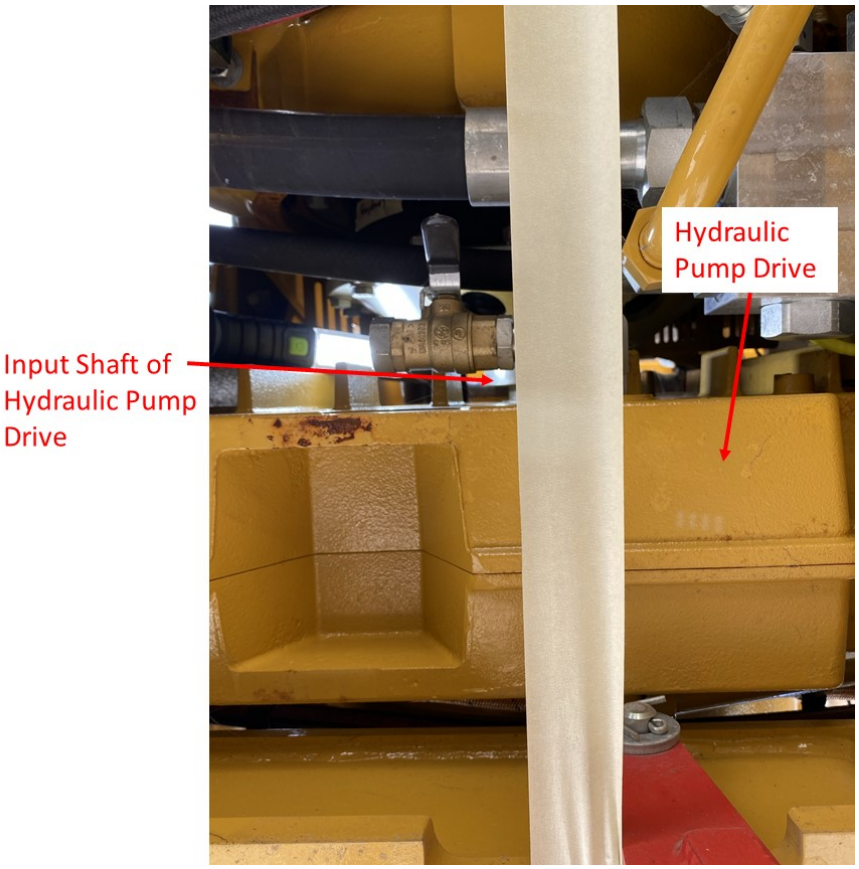


(D.I. 1-3 at 178). The photographs below show the alignment of the axes of the drive engine, hydraulic pump drive, and the drive pulley as observed on a PM620 manufactured at least on or before about December 2018.


DRIVE PULLEY AXIS

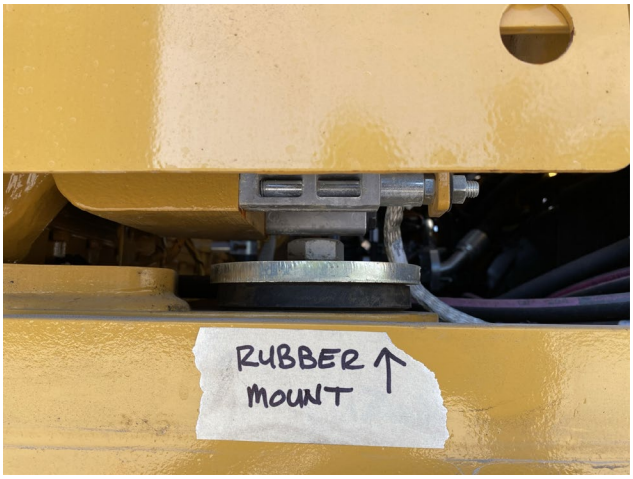

Hydraulic Pump Drive
Drive Engine Oil Pan


Hydraulic
Pump Drive
Input Shaft of
Hydraulic Pump
Drive


Input Shaft of
Hydraulic Pump
Drive
Hydraulic
Pump Drive

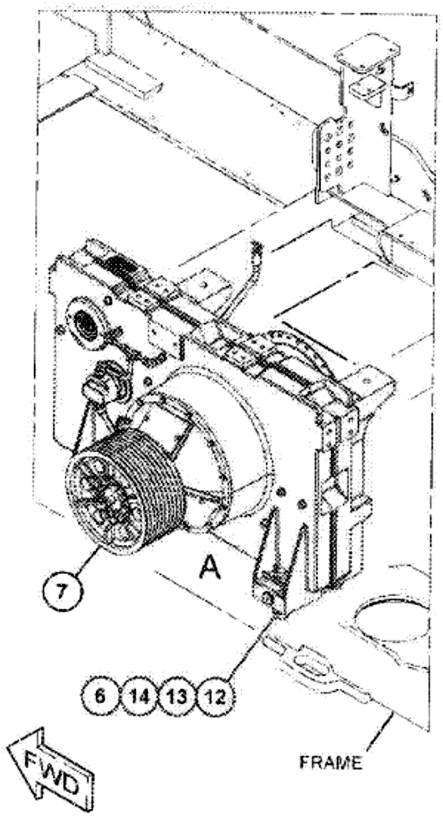
310. The first subset is attached to the machine frame elastically (i.e., through rubber mounts). The photographs below show the drive engine mounted to the frame via rubber mounts as observed on a PM620 manufactured at least on or before about December 2018.


RUBBER MOUNT
DRIVE ENGINE

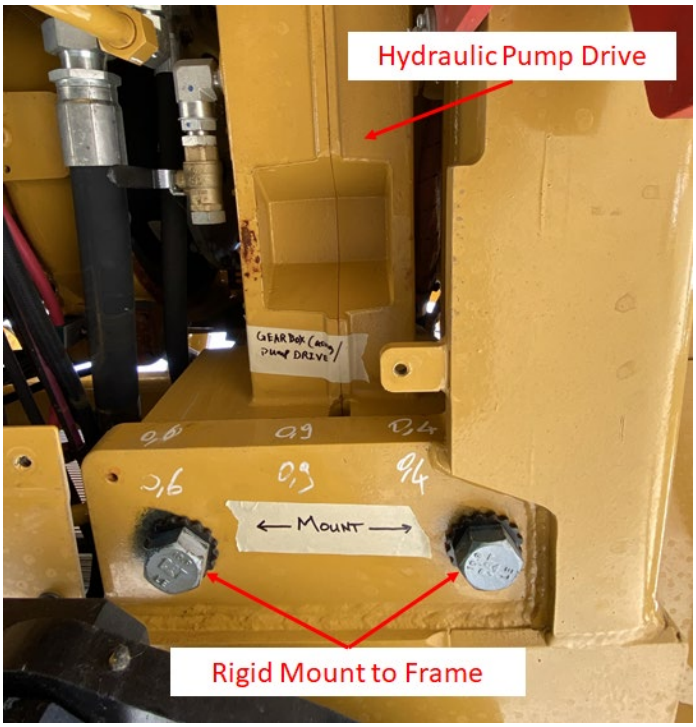

RUBBER MOUNT


RUBBER MOUNT

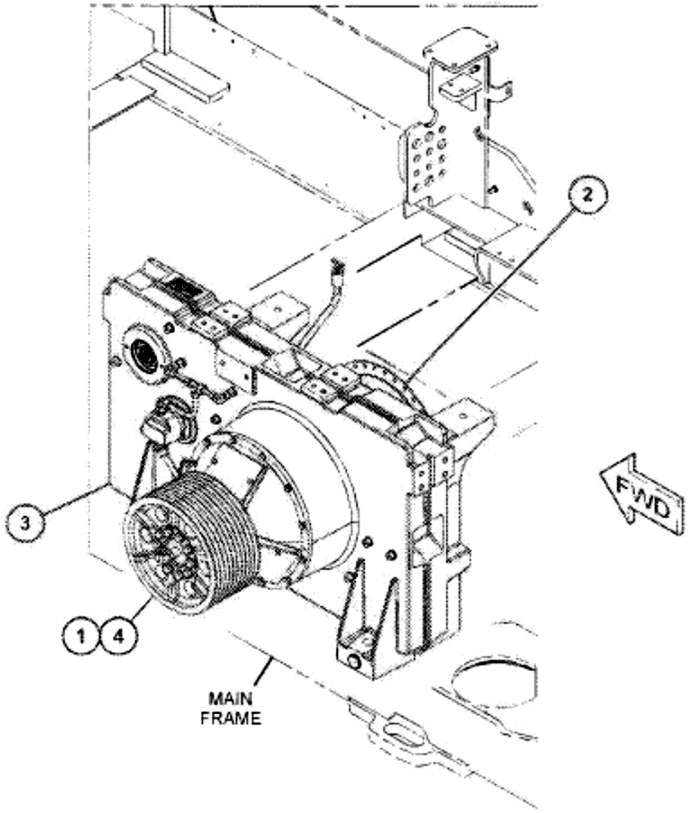
311. The second subset is attached to the machine frame rigidly (i.e., bolted to the machine frame). For example, in the schematic below, designated "390-2869 Mounting GP-Drive Axle," items 12, 13, and 14 are a bolt, nut, and washer, respectively.



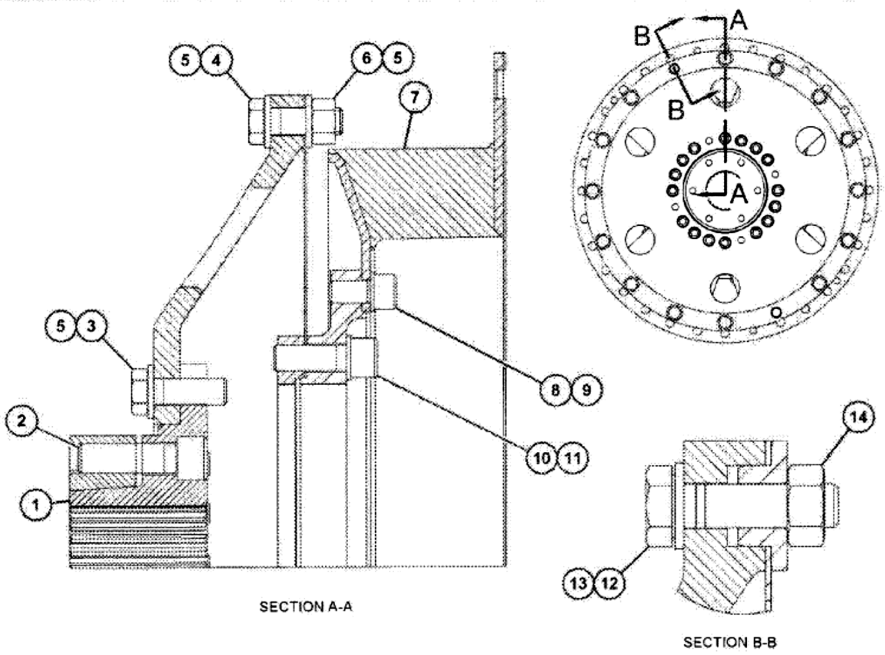
(D.I. 1-4 at 37.) The photographs below show the hydraulic pump drive, to which is attached the clutch and the drive pulley, mounted to the frame rigidly as observed on a PM620 manufactured at least on or before about December 2018.



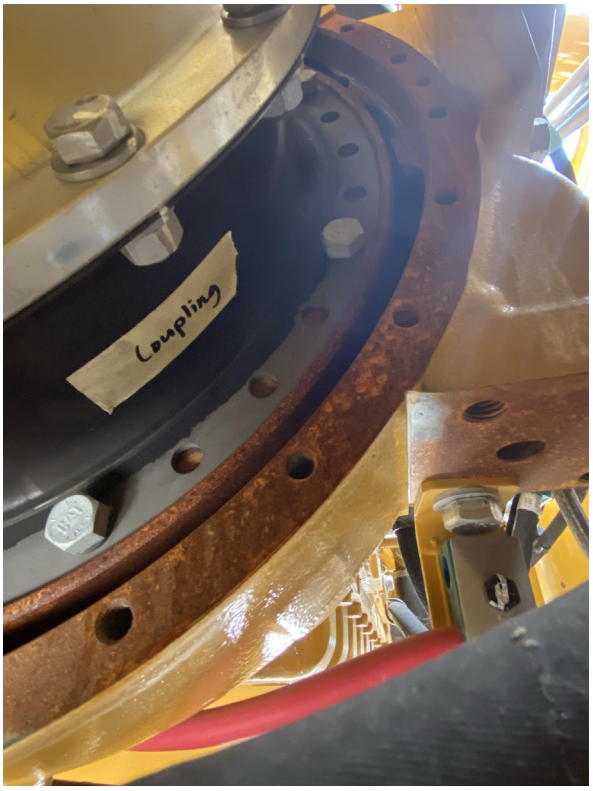
312. The drive train further includes an articulated coupling connecting the first subset to the second subset. For example, in the schematic below, designated "395-1930 Drive GP-Pump," item 2 (Part No. 374-1353, Coupling GP – Torsional) is the articulated coupling.



(D.I. 1-4 at 37.) The inner flexible coupling (Part # 486-4439, Coupling – Inner) is designated 7 in the schematic below, which represents "374-1353 Coupling GP – Torsional" as "Part of 395-1930 Drive GP-Pump."



(D.I. 1-3 at 180.) The photographs below show a view of the articulated coupling from a PM620 manufactured at least on or before about December 2018 showing an elastomeric articulated coupling that accommodates a lack of alignment between the output axis of the drive engine and the input axes of the hydraulic pump drive and the drive pulley.



313. Accordingly, all the claim limitations of claim 14 of the ’268 patent are met by

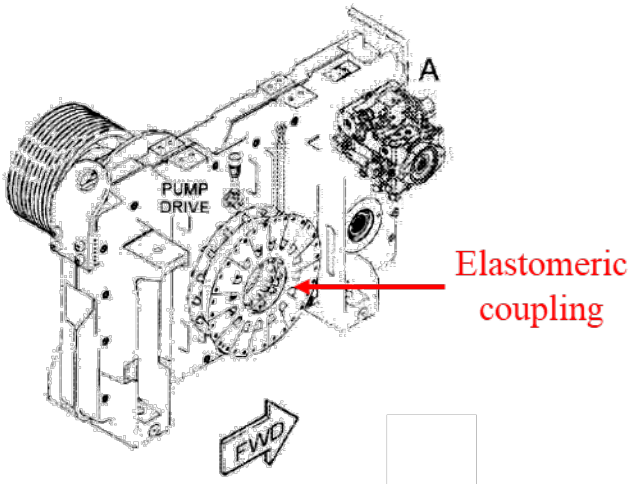
Large Infringing Products.

314. Claim 34 recites:

A construction machine, comprising:
a machine frame carried by a chassis;
a working drum;
a drive train including at least the following elements:
a drive engine;
a traction drive assembly for mechanically driving the working drum, the traction drive assembly including a drive element, an output element, and a traction element;
a clutch for switching a torque between the drive engine and the working drum; and
a hydraulic pump drive; and
wherein the elements of the drive train are divided into at least a first subset and a second subset; and
wherein the drive train further includes an articulated coupling connecting the first subset to the second subset; and
wherein the first subset includes at least the drive engine; and
wherein the second subset includes the drive element of the traction drive assembly and at least one element selected from the group consisting of:
the hydraulic pump drive; and
the clutch; and
wherein the first subset is attached to the machine frame elastically with a lower spring stiffness so that transmission of vibrations to the machine frame is reduced, and the second subset is attached to the machine frame with a higher spring stiffness or in a rigid manner; and
wherein the hydraulic pump drive includes:
a gearbox casing;
a plurality of hydraulic pumps projecting from the gearbox casing; and
the hydraulic pump drive having an interior space free of hydraulic pumps; and
wherein the articulated coupling extends into the interior space of the hydraulic pump drive;
wherein the drive engine has an output axis aligned with an input axis of the drive element and with an input axis of one of the hydraulic pump drive and the clutch prior to operation of the construction machine; and
wherein the articulated coupling accommodates a lack of alignment between the output axis of the drive engine and the input axes of the drive element and one of the hydraulic pump drive and the clutch due to dynamic movement of the first subset relative to the second subset during operation of the construction machine.

315. As shown below, the hydraulic pump drive has an interior space free of

hydraulic pumps into which the articulated coupling extends. Shown below is yet another schematic showing the pump drive with a third pump connected.



(D.I. 1-4 at 97.)

316. Accordingly, and for the reasons discussed with respect to claim 14, all the claim limitations of claim 34 of the '268 patent are met by Large Infringing Products.

317. Claim 1 of the '268 patent is an exemplary method claim:

> A method of operating a construction machine, the construction machine including a machine frame carried by a chassis, a working drum, and a drive train, the drive train including at least a drive engine component, [~~a traction drive component for driving the working drum,~~] a clutch component, [~~and~~] a hydraulic pump drive component, *and a traction drive for driving the working drum including a drive pulley, a driven pulley attached to the working drum, and a drive belt connecting the pulleys*, the method comprising:
>
> (a) driving a subset of the components of the drive train from the drive engine component with an articulated coupling connected between the drive engine component and the subset of the components, the subset including at least *the drive pulley of* the traction drive [~~component for driving the working drum~~], *the clutch component and the hydraulic pump drive component, with the clutch component being located between the hydraulic pump drive component and the drive pulley*;
>
> (b) supporting the drive engine component from the machine frame elastically with a first spring stiffness; and
>
> (c) supporting the subset of the components from the machine frame in a rigid manner or with a second spring stiffness[~~, the second spring stiffness~~] being relatively higher than the first spring stiffness;
>
> *wherein the drive engine component has an output axis aligned with an*

input axis of the hydraulic pump drive component and with an input axis of the drive pulley prior to operation of the construction machine; and

wherein in step (a) the articulated coupling accommodates a lack of alignment between the output axis of the drive engine component and the input axes of the hydraulic pump drive component and the drive pulley due to dynamic movement of the drive engine component relative to the subset of the components during operation of the construction machine.

318. When a customer operates a Large Infringing Product, the milling drum and hydraulic pump drive are driven by the engine via the elastomeric coupling, which accommodates a lack of alignment between the output axis of an engine component with the input axes of a pump drive component and the motor-side pulley due to dynamic movement of the engine relative to the pump drive and motor-side pulley.

319. Thus, for the reasons discussed above regarding claim 14, all the claim limitations of claim 1 of the ’268 patent are met by use of Large Infringing Products.

320. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the ’268 patent.

321. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

322. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

323. Caterpillar’s acts are or were deliberate and willful and will continue unless enjoined by this Court.

324. As a result of the deliberate and willful nature of Caterpillar’s acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys’ fees.

COUNT 11: INFRINGEMENT OF U.S. PATENT NO. 8,424,972
(PARALLEL TO SURFACE)

325. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

326. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the '972 patent by importing, making, distributing, using, offering to sell, or selling one or more Large Infringing Products.

327. Caterpillar has engaged in activities which constitute direct infringement of at least claims 1, 3, 9, and 12 of the '972 patent, in violation of U.S.C. § 271(a).

328. Upon information and belief, Caterpillar's customers that have purchased Large Infringing Products have and continue to engage in activities which constitute direct infringement of at least claims 31, 33, and 37 of the '972 patent, in violation of 35 U.S.C. § 271(a).

329. Caterpillar has and is inducing infringement of the '972 patent by actively and knowingly inducing purchasers of Large Infringing Products to use those products in a way that infringes at least claim 31 of the '972 patent, in violation of 35 U.S.C. § 271(b). Operation of Large Infringing Products during milling practices at least claim 31 of the '972 patent.

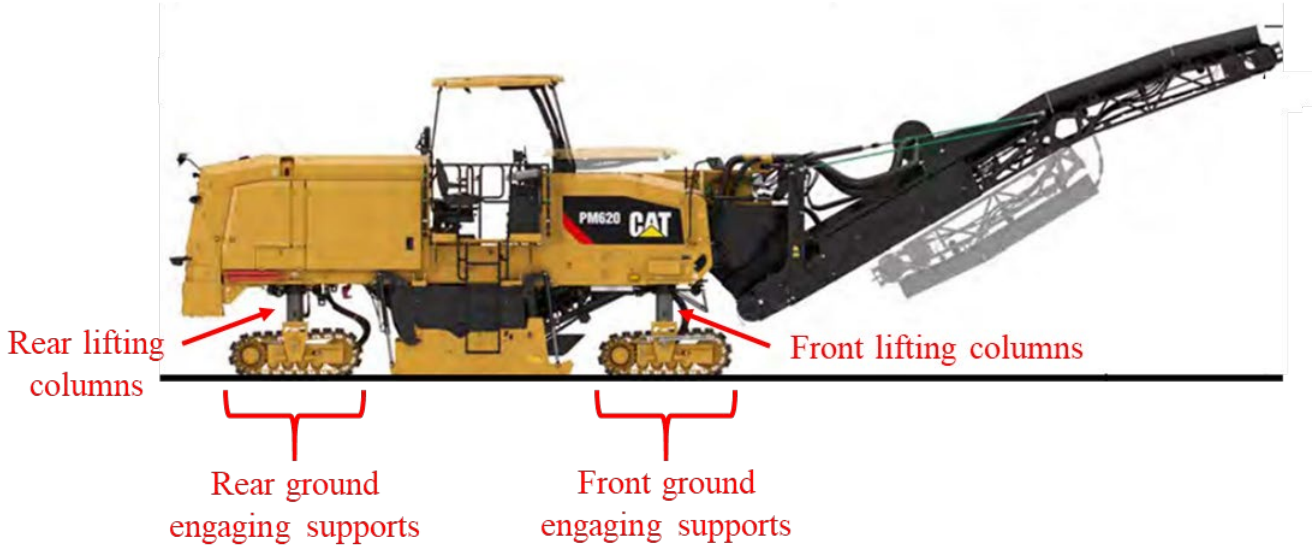
330. Claim 1 of the '972 patent is exemplary:

> A self-propelling road milling machine, comprising:
> a machine frame;
> at least two front ground engaging supports, and at least one rear ground engaging support, with reference to a direction of travel;
> front and rear lifting columns supporting the frame from the ground engaging supports;
> a milling roller supported from the frame for treatment of a ground surface;
> first and second height adjustable side plates arranged on opposite sides of the milling roller;
> a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller;
> at least one ground engaging sensor; and

> a controller operably associated with the at least one ground engaging sensor, the controller being configured to automatically control a lifting condition of at least one of the lifting columns to establish a parallel orientation of the machine frame relative to the ground surface in the direction of travel.

331. As discussed previously, Large Infringing Products are construction machines, with a machine frame, a working drum (i.e., a milling roller) supported therefrom for the treatment of ground surfaces.

332. Large Infringing Products include two front engaging ground supports and two rear ground engaging supports, with reference to a direction of travel, and two front lifting columns and two rear lifting columns supporting the frame from the ground engaging supports.



(D.I. 1-1 at 260.)

333. As discussed previously, Large Infringing Products include first and second height adjustable side plates arranged on opposite sides of the milling roller and a height adjustable stripping plate (i.e., the moldboard) arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller.

334. Large Infringing Products include at least one ground engaging sensor.

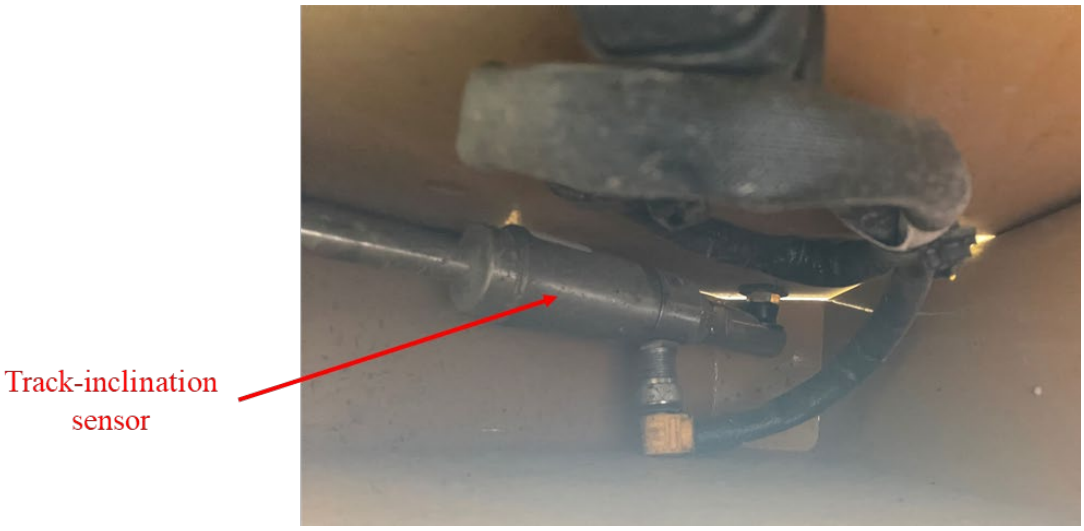
335. As discussed previously, Large Infringing Products manufactured at least

before about October 2020 include four lifting position sensors, each of which is coupled with elements of a respective lifting column.

336. Large Infringing Products manufactured at least after about October 2020 include a track-inclination sensor on each of the two rear tracks.

337. The photographs below show one of the two track-inclination sensors on a PM822 machine believed to have been manufactured at least after about October 2020. The first photograph shows a view of the track angle sensor extending from a casing that protects the sensor during operation.

The second photograph shows a view of the track angle sensor looking inside the casing.



338. Large Infringing Products include a controller operably associated with the at least one ground engaging sensor wherein the controller is configured to automatically control a lifting condition of at least one of the lifting columns to establish a parallel orientation of the machine frame relative to the ground surface in the direction of travel.

339. For example, as discussed previously, the lifting position sensors of Large Infringing Products manufactured before at least about October 2020 provide a path signal pertaining to the lifting position of the lifting column to the ECM, which regulates the lifting positions of the lifting columns in response to the path signals detected by the lifting position sensors.

340. On information and belief, the track inclination sensors of Large Infringing Products manufactured after at least about October 2020 provide a path signal pertaining to the relative angle of the tracks to the machine frame to the ECM, which regulates the lifting positions of the lifting columns in response to the path signals detected by the track inclination sensors.

341. On information and belief, when the rear tracks of Large Infringing Products enter or exit a cut (i.e., the track produced by the milling drum removing material from a road surface), the controller uses signals from the ground engaging sensors (either the lifting positions

sensors or track-inclination sensors, depending on which sensors a Large Infringing Product is equipped with) to automatically regulate the lifting conditions of the rear lifting columns to establish a parallel orientation of the machine frame relative to the ground surface in the direction of travel.

342. Accordingly, Large Infringing Products meet all the limitations of claims 1 of the ’972 patent.

343. Claim 31 of the ’972 patent recites:

> A method of milling a ground surface with a milling machine having a machine frame, a milling roller supported from the machine frame, front and rear ground engaging supports with reference to a direction of travel, and front and rear lifting columns supporting the machine frame from the ground engaging supports, the method comprising:
> (a) detecting a longitudinal inclination of the machine frame relative to the ground surface in the direction of travel by detection of at least one measurement value from at least one ground engaging sensor; and
> (b) automatically controlling a lifting condition of at least one of the lifting columns so as to automatically establish a parallel orientation of the machine frame to the ground surface in the direction of travel, in dependence on the detected longitudinal inclination of the machine frame.

344. For the same reasons discussed regarding claim 1 of the ’972 patent, use of Large Infringing Products during a milling operation where the rear tracks enter or exit a cut meets all the limitations of claim 31 of the ’972 patent.

345. Caterpillar’s programming of Large Infringing Products to automatically practice claim 31 when the rear tracks enter or exit a cut induces infringement of claim 31 by its customers.

346. Claim 3 of the ’972 patent recites:

> The road milling machine of claim 1, wherein:
> the at least one ground engaging sensor includes first and second ground engaging sensors displaced relative to each other in the direction of travel, the first and second ground engaging sensors generating first and second distance signals corresponding to a distance of the frame from the ground surface at the

first and second ground engaging sensors, respectively; and

the controller is configured to detect a longitudinal inclination of the frame in the direction of travel from the first and second distance signals.

347. Claim 9 of the '972 patent recites:

The road milling machine of claim 3, wherein:

each of the first and second ground engaging sensors comprises a path measurement system configured to generate the first and second distance signals.

348. Each of the four lifting position sensors of Large Infringing Products manufactured before at least about October 2020 generate distance signals corresponding to a distance of the frame from the ground surface at the respective lifting position sensor.

349. As the specification of the '972 patent explains, "[t]he path measurement systems can be integrated in the lifting columns or in the hydraulic cylinders of the lifting columns."

350. Each of the four lifting positions sensors comprises a path measurement system to generate those distance signals.

351. As discussed previously, each lifting position sensor provides a path signal pertaining to the lifting position of the lifting column to the ECM.

352. On information and belief, the controller of Large Infringing Products manufactured before at least about October 2020 detects and/or determines the longitudinal inclination of the frame in the direction of travel based on the distance signals received from the lifting position sensors.

353. Accordingly, Large Infringing Products manufactured before at least about October 2020 meet all the limitations of claims 3 and 9 of the '972 patent.

354. Claim 12 of the '972 patent recites:

The road milling machine of claim 1, wherein:

the ground engaging supports comprise track assemblies; and

> the at least one ground engaging sensor comprises at least one of the track assemblies and further comprises a relative angle detector configured to detect a relative angle between at least one of the lifting columns extending orthogonally to the frame and the track assembly associated with the at least one of the lifting columns when the track assembly engages and extends parallel to the ground surface.

355. As discussed previously, Large Infringing Products manufactured after at least about October 2020 include ground engaging sensors that each comprise a track assembly and a relative angle detector configured to detect a relative angle between the lifting column and the track assembly connected to the lifting column.

356. As discussed previously, each track-inclination sensor attaches to the bracket connecting the lower cylindrical leg tube to the crawler track and, on the other end, to the crawler track. Thus, the track-inclination sensor determines the relative angle between the lifting column and the track.

357. Accordingly, Large Infringing Products manufactured before at least about October 2020 meet all the limitations of claim 12 of the ’972 patent.

358. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the ’972 patent.

359. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

360. Caterpillar Paving Products cited the ’972 patent during prosecution of U.S. Patent Nos. 9,797,100 (filed May 23, 2016) and 10,662,590 (filed January 8, 2019).

361. An examiner cited the ’972 patent during prosecution of U.S. Patent Nos. 9,103,079 (filed October 25, 2013) and 10,844,557 (filed March 27, 2019) and U.S. Patent App. No. 16/399,340 (filed April 30, 2019), which list Caterpillar Paving Products as the Applicant.

362. Caterpillar has made profits from its acts of patent infringement, and Plaintiff

has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

363. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

364. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 12: INFRINGEMENT OF U.S. PATENT NO. 9,879,390
(SMART SIDE PLATE 1)

365. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

366. Caterpillar has and continues to directly, and willfully, infringe one or more claims of the '390 patent by importing, making, distributing, using, offering to sell, or selling one or more Infringing Products.

367. Caterpillar has engaged in activities which constitute direct infringement of at least claims 1–4 of the '390 patent, in violation of U.S.C. § 271(a).

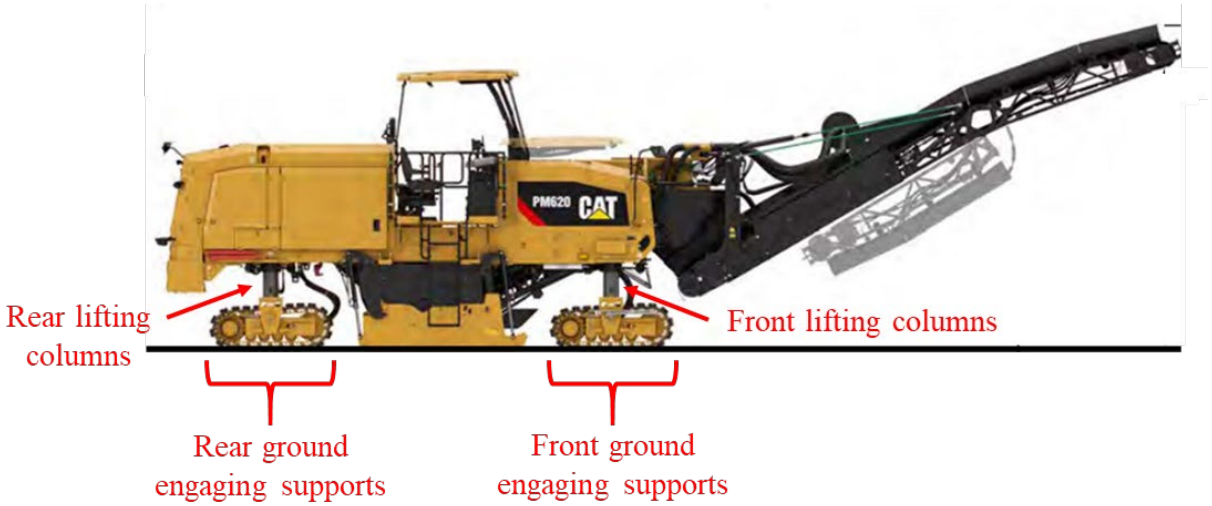
368. Claim 1 of the '390 patent is exemplary:

> A self-propelled road milling machine, comprising:
> a machine frame;
> at least two front ground engaging supports, and at least one rear ground engaging support;
> front and rear lifting columns supporting the frame from the ground engaging supports;
> a milling roller supported from the frame for treatment of a ground surface;
> a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller;
> first and second height adjustable side plates arranged on opposite sides of the milling roller; and
> a plurality of position sensors, each of the first and second side plates including at least two of the position sensors spaced apart in a traveling direction

of the milling machine, wherein each position sensor generates position signals representing changes in position for a respective side plate.

369. As discussed previously, Infringing Products include road milling machines having a machine frame, a working drum (i.e., a milling roller) supported therefrom for the treatment of ground surfaces.

370. Infringing Products have two front and two rear ground engaging supports and front and rear lifting columns supporting the frame from the ground engaging supports.



(D.I. 1-1 at 260.)

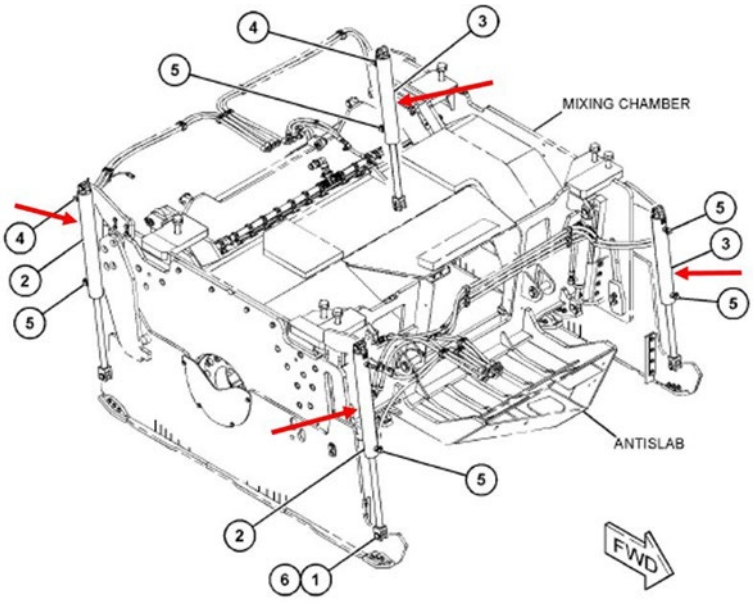
(Ex. 42 at 5.)

371. As discussed previously, Infringing Products have a height adjustable stripping plate (i.e., moldboard) behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller.

372. Also as discussed previously, Infringing Products include first and second height adjustable side plates arranged on opposite sides of the milling roller and two position-sensing cylinders connected to each side plate that generate position signals representing changes in position for a respective side plate.

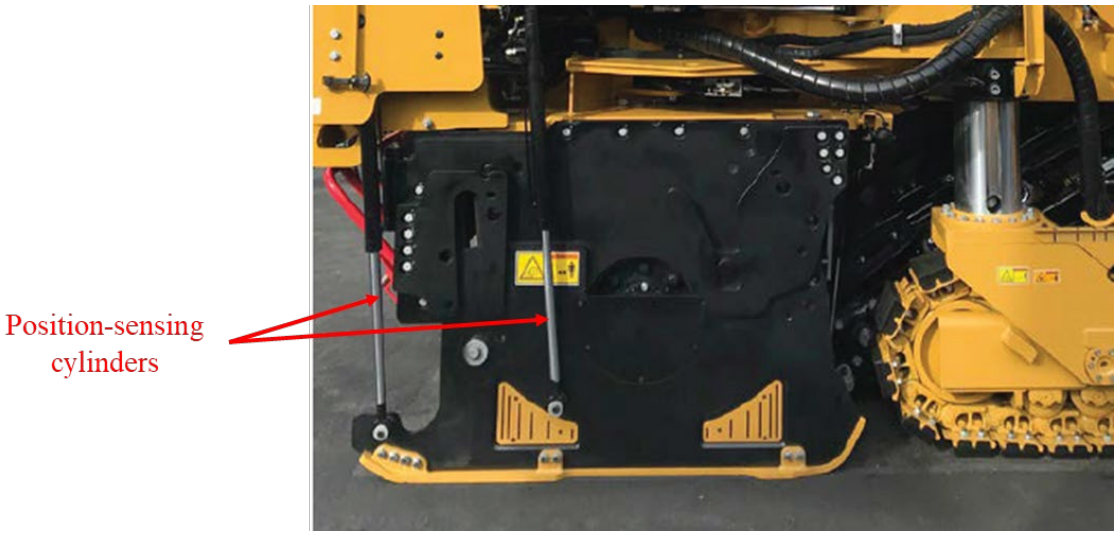
373. For example, in Large Infringing Machines, each side plate (encloses the area to the sides of the milling drum) is height-adjustable via hydraulic cylinders equipped with smart sensors that are spaced apart in a traveling direction of the milling machine. Exhibit 21 shows a left and right side plate, relative to the direction of travel, that is height-adjustable via hydraulic cylinders (red arrows and designated “2” for right side or “3” for left side) that contain a linear

position sensor (part # 419-3871).



(D.I. 1-4 at 15.)

374. Each of the left and right side plates of Compact Infringing Machines are similarly equipped with two position-sensing cylinders spaced apart in a traveling direction of the milling machine.



(Ex. 42 at 6.)

375. Accordingly, the Infringing Products meet all the limitations of claim 1 of the

’390 patent.

376. Claim 2 recites:

> The self-propelled road milling machine of claim 1, further comprising a controller operably associated with the position sensors and configured to measure, based at least in part on the position signals from the position sensors, displacement of the side plates with respect to the machine frame.

377. Claim 3 recites:

> The self-propelled road milling machine of claim 2, wherein the plurality of position sensors are integrated with hydraulic piston/cylinder units for lifting or lowering the respective side plates.

378. Claim 4 recites:

> The self-propelled road milling machine of claim 2, wherein the controller is configured to control the milling depth of the milling roller by generating control signals to vertically adjust one or more of the lifting columns.

379. As discussed previously, Large Infringing Products have a controller that utilizes the signals from the side-plate position-sensing cylinders to measure displacement of the side plates with respect to the machine frame and generates control signals to vertically adjust one or more of the lifting columns.

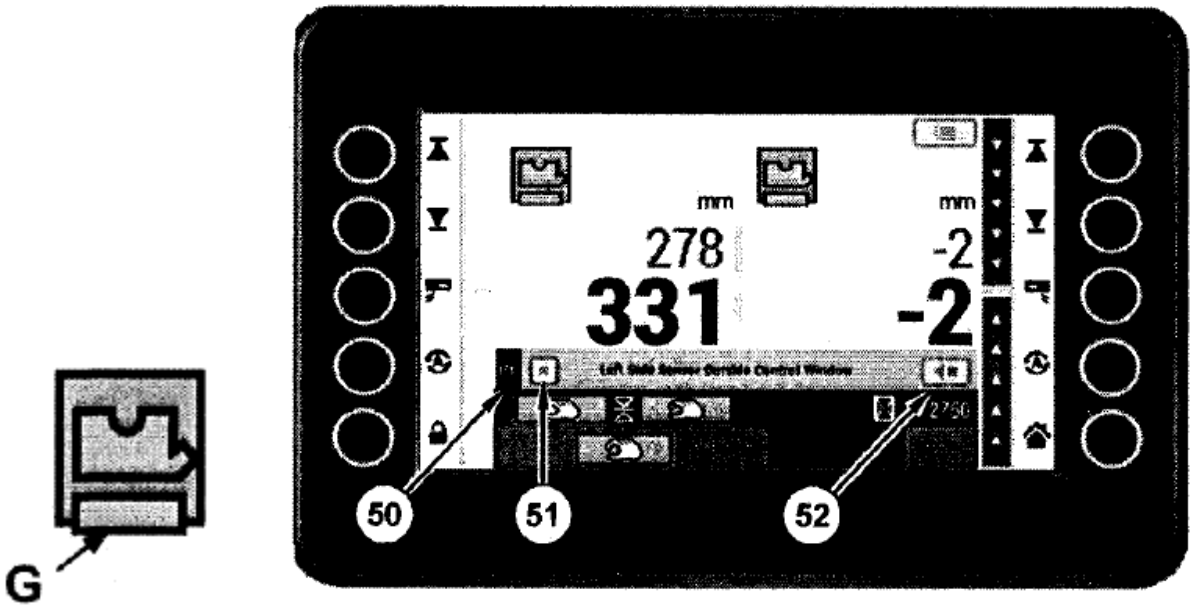
380. For example, Caterpillar advertises an automatic grade and slope control system. The figure below shows a screenshot of the user interface for the grade and slope control system for Compact Infringing Machines depicting the use of automatic grade and slope control based in part on signals generated by the position-sensing cylinders on the left side plate.

IMPROVE ACCURACY WITH AUTOMATED FEATURES

Take the guesswork out of producing accurate and repeatable cutting results by using automated features within the integrated Cat GRADE with Grade and Slope system. The optional grade control box allows easy access to elevation and slope settings and can be positioned in the operator station or on the back of the machine to enable interaction with the grade system from the ground level. Need to switch sensors? Seamlessly swap between multiple grade or slope sensors for uninterrupted accuracy and a smooth result for any project.

(Ex. 42 at 7.)

381. Similarly, a systems operation manual for PM620 and PM622 Cold Planer Monitoring System/Grade and Slope depicts "Sensor Options" that can be selected in the grade and slope control user interface that include the side plate:



(D.I. 1-6 at 769, 777.)

382. Accordingly, Infringing Products meet all the limitations of claims 2–4 of the '390 patent.

383. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the '390 patent.

384. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

385. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

386. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

387. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

COUNT 13: INFRINGEMENT OF U.S. PATENT NO. 9,879,391
(SMART SIDE PLATE 2)

388. Plaintiff hereby re-alleges and incorporates by reference the allegations of all preceding paragraphs of this Complaint as if fully set forth herein.

389. Caterpillar has and continues to directly or indirectly, and willfully, infringe one or more claims of the ’391 patent by importing, making, distributing, using, offering to sell, or selling one or more Infringing Products.

390. Upon information and belief, Caterpillar’s customers that have purchased Infringing Products have and continue to engage in activities which constitute direct infringement of at least claims 8–10 of the ’391 patent, in violation of 35 U.S.C. § 271(a).

391. Caterpillar has and is inducing infringement of the ’391 patent by actively and knowingly inducing purchasers of Infringing Products to use those products in a way that infringes at least claims 8–10 of the ’391 patent, in violation of 35 U.S.C. § 271(b). Operation of Infringing Products during milling operations where the customer selects the side plate as a reference for grade and slope control practices at least claims 8–10 of the ’391 patent.

392. Claim 8 of the ’391 patent is exemplary:

> A method of controlling a milling machine, the milling machine having a machine frame, a milling roller supported from the machine frame, front and rear ground engaging supports, front and rear lifting columns supporting the machine frame from the ground engaging supports, and first and second side plates on opposing sides of the milling roller, the side plates being height-adjustable with respect to the machine frame, the method comprising:
>
> receiving position sensing signals from first and second position sensors spaced apart in a traveling direction on one or more of the side plates; and
>
> measuring a displacement of the one or more of the side plates with respect to the machine frame, based on the received position sensing signals.

393. Claim 9 recites:

The method of claim 8, further comprising calculating a current milling depth of the milling

roller based at least in part on received position sensing signals from the position sensors on the one or more of the side plates.

394. Claim 10 recites:

The method of claim 9, further comprising automatically controlling a vertical adjustment of the milling roller based at least in part on the calculated current milling depth with respect to a set milling depth value.

395. For the same reasons discussed regarding the '390 patent, use of Infringing Products meets all the limitations of claims 8–10 of the '391 patent.

396. Caterpillar has or has been, at all times relevant to this action, fully aware of and has or had actual knowledge of the '390 patent.

397. On information and belief, Caterpillar regularly monitors the patent filings of their competitors, including Wirtgen.

398. Caterpillar Paving Products Inc. cited the '391 patent during prosecution of U.S. Patent Nos. 10,876,260 (filed March 27, 2019) and 10,844,557 (filed March 27, 2019).

399. Caterpillar has made profits from its acts of patent infringement, and Plaintiff has suffered damages for which it is entitled to relief under 35 U.S.C. § 284.

400. Caterpillar's acts are or were deliberate and willful and will continue unless enjoined by this Court.

401. As a result of the deliberate and willful nature of Caterpillar's acts, such damages should be increased to the maximum amount allowed by law, including an award of attorneys' fees.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff requests judgment against Caterpillar Inc. as follows:

A. That Caterpillar Inc. and all of its subsidiaries, affiliates, officers, agents, servants, employees, attorneys, and their heirs, successors and assigns, and all persons acting in

concert or participation with it and each of them, be immediately enjoined and restrained, preliminarily and permanently, without bond, from manufacturing, distributing, selling or offering for sale in the United States or importing into the United States products infringing the claims of the patents-at- issue; and deliver to Plaintiff all products that infringe the patents-at-issue;

B. A judgment by the Court that Caterpillar has infringed U.S. Patent Nos. 7,828,309; 8,118,316; 7,530,641; 8,113,592; 9,010,871; 9,656,530; 7,946,788; 8,511,932; 8,690,474; RE48,268; 8,424,972; 9,879,390; and 9,879,391;

C. An award of damages for infringement of U.S. Patent Nos. 7,828,309; 8,118,316; 7,530,641; 8,113,592; 9,010,871; 9,656,530; 7,946,788; 8,511,932; 8,690,474; RE48,268; 8,424,972; 9,879,390; and 9,879,391, together with prejudgment interest and costs, said damages to be trebled by reason of the intentional and willful nature of Caterpillar's infringement, as provided by 35 U.S.C. § 284;

D. A determination that this case is "exceptional" under 35 U.S.C. § 285, and an award of Plaintiff's reasonable attorneys' fees;

E. That any monetary award includes pre- and post-judgment interest at the highest rate allowed by law;

F. For costs of suit; and,

G. For such other or further relief as the Court deems just and proper.

DEMAND FOR TRIAL BY JURY

Plaintiff, pursuant to Rule 38 of the Federal Rules of Civil Procedure, respectfully demands a trial by jury of any issues triable of right by a jury.

Dated: September 2, 2021

OF COUNSEL:

Ryan D. Levy
Seth R. Ogden
William E. Sekyi
Scott M. Douglass
Dominic A. Rota
Mark A. Kilgore
John F. Triggs
PATTERSON INTELLECTUAL PROPERTY LAW, P.C.
1600 Division Street, Suite 500
Nashville, Tennessee 37203
(615) 242-2400
rdl@iplawgroup.com
sro@iplawgroup.com
wes@iplawgroup.com
smd@iplawgroup.com
dar@iplawgroup.com
mak@iplawgroup.com
jft@iplawgroup.com

Daniel E. Yonan
Paul A. Ainsworth
R. Wilson Powers III
Kyle E. Conklin
Dallin Glenn
Deirdre M. Wells
Richard J. Uberto Jr.
Davin B. Guinn
STERNE, KESSLER, GOLDSTEIN & FOX, PLLC
1100 New York Ave., NW, Suite 600
Washington, DC 20005
(202) 371-2600
dyonan@sternekessler.com
painsworth@sternekessler.com
tpowers@sternekessler.com
kconklin@sternekessler.com
dglenn@sternekessler.com
dwells@sternekessler.com
ruberto@sternekessler.com
dguinn@sternekessler.com

YOUNG CONAWAY STARGATT & TAYLOR, LLP

/s/ Adam W. Poff
Adam W. Poff (No. 3990)
Rodney Square
1000 North King Street
Wilmington, DE 19801
(302) 571-6600
apoff@ycst.com

Attorneys for Plaintiff